Telemium IP

Installation

Issue	Release Date	Changes
1	xx-02	Initial release

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mlj/2002

Regulatory Information (U.S.A.)

The Federal Communications Commission (FCC) established rules to allow the direct connection of the *Telenium*^{IP} to a telephone network. Certain actions must be undertaken or understood before the connection of customer provided equipment is completed.

Telephone Company Notification

Before connecting the *Telenium*^{IP} to the telephone network, the local serving telephone company must be given advance notice of intention to use customer provided equipment, and must be provided with the following information:

Telephone Numbers

The PSTN line telephone numbers to be connected to the system.

System Information

- Ringer Equivalence - 0.7B
- Registered Jack -
  RJ-11 with Desk Holder/Wall Mount
  RJ-21X with Main Cabinet install

FCC Registration Numbers

US : 5JYKFO7BLIK-70
US : 5JYMFO7BLIK-70

Incidence of Harm

If the telephone company determines that the customer provided equipment is faulty and possibly causing harm or interruption to the telephone network, it should be disconnected until repairs can be made. If this is not done, the telephone company may temporarily disconnect service.

Changes in Service

The local telephone company may make changes in its communications facilities or procedures. If these changes affect the use of the *Telenium*^{IP} or compatibility with the network, the telephone company must give written notice to the user to allow uninterrupted service.

Maintenance Limitations

Maintenance on the *Telenium*^{IP} System must be performed only by the manufacturer or its authorized agent. The user may not make any changes and/or repairs except as specifically noted in this manual. If unauthorized alterations or repairs are made, any remaining warranty and the software license for the system will be voided.

Hearing Aid Compatibility

All *Telenium*^{IP} Digital Terminals are Hearing Aid Compatible, as defined in Section 68.316 of Part 68 FCC Rules and Regulations.

UL/CSA Safety Compliance

The *Telenium*^{IP} System has met all safety requirements and was found in compliance with the Underwriters Laboratories (UL) 1459. This system is authorized to bear the "NRTL/C" marking.

Notice of Compliance

This device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation. In accordance with FCC Standard 15 (Subpart J), the following information is supplied to the end user:

"This equipment generates and uses RF energy and if not installed and used in accordance with the Instruction Manual, may cause interference to Radio Communications. It has been tested and found to comply with the limits for a Class A computing device, pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference, when operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user, at his own expense, will be required to take whatever measures may be required to correct the interference."

Toll Fraud and DISA Disclaimer

"While this device is designed to be reasonably secure against intrusions from fraudulent callers, it is by no means invulnerable to fraud. Therefore, no express or implied warranty is made against such fraud including interconnection to the long distance network."

"While this device is designed to be reasonably secure against invasion of privacy, it is by no means invulnerable to such invasions. Therefore, no express or implied warranty is made against unlawful or unauthorized utilization which results in the invasion of one's right of privacy."

Vodavi has made every reasonable effort to ensure that this product works in most business environments. However, there may be some environments (RFI and EFI) in which this product may not work properly. In such cases, it is the responsibility of the installer to take the necessary actions to correct the situation.

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1 Introduction

This chapter provides introductory information regarding installation of the *Telenium*^{IP} system. It also provides a listing of the part numbers for the system's components, technical specifications, and regulatory information.

Product Description

The *Telenium*^{IP} is an Internet Protocol (IP) based Key Telephone System designed to meet the telecommunication needs of the small to medium sized business. The *Telenium*^{IP} uses advanced packet voice and IP switching technology, which is combined with a rich feature content, to set a new standard in converged Voice over IP (VoIP) systems.

The *Telenium*^{IP} consists of a family of intelligent modules, which are interconnected over a 10/100 Base-T Ethernet LAN, easing the installation process and eliminating the need for an expensive back plane. A variety of modules are available including analog and digital network access gateways, which connect to the Public Switched Telephone Network (PSTN), ISDN, or public and private VoIP networks. The Switching Hub, which provides connection to individual IP Keysets, incorporates circuitry for "power-feed" over the LAN. IP Keysets provide the user with simple access to the many features and functions of the *Telenium*^{IP}.

Adaptable Mounts -- The modules that make up the *Telenium*^{IP} can be shelf-mounted (book-end), or installed in the *Telenium*^{IP} Main Cabinet. The Cabinet can be placed on a desktop, in a 19" rack, or mounted to a wall to best fit the user needs and their telephone equipment room.

Telephone Compatibility -- The *Telenium*^{IP} supports a variety of *Telenium*^{IP} Keysets and analog single line devices. With the IP Keyset, commonly used features are activated by selecting a single button. Additionally, most functions can be accessed from any telephone by dialing specific codes. For IP Keyset users, these "dial codes" may be assigned to Flexible buttons for easy access. In addition to the IP Keysets, an optional DSS Console is available.

Enhanced Features -- The *Telenium*^{IP} provides an environment rich in features and is comparable to today's traditional circuit switched telephone systems. In addition to a fully featured voice intercom, the *Telenium*^{IP} incorporates enhanced messaging, basic Auto Attendant/Voice Mail, Least Cost Routing, and Automatic Call Distribution, as well as Web-based administration, and VoIP network interface.

System Benefits -- By employing packet voice and IP switching, the *Telenium*^{IP} infrastructure can be employed for or can share the business's data network. Since all modules and terminals have a unique IP address, they can be moved anywhere on the *Telenium*^{IP} LAN and function without the need for "re-programming" the switch. The use of the single common infrastructure and ability to easily install or relocate modules and telephones results in significant savings at installation and over the life of the system.

The reliability, extensive feature content, and the capability to use an array of modules and instruments, permit the *Telenium*^{IP} to be tailored to meet the short and long term needs of the most demanding customer requirements.

Computer Requirements

Recommended computer-related requirements for use with the *Telenium*^{IP} system are:

- CPU: Pentium III and above
- RAM: 128M SDRAM and above
- OS: Windows 98 (2nd Ed), Windows 2000, Windows XP (excludes Windows ME)
- Internet Explorer 5.5 or higher

System Diagram

Network Configuration Example

The following diagram shows how the *Telenium*^{IP} system can be configured to work with a varitey of modules and terminals.

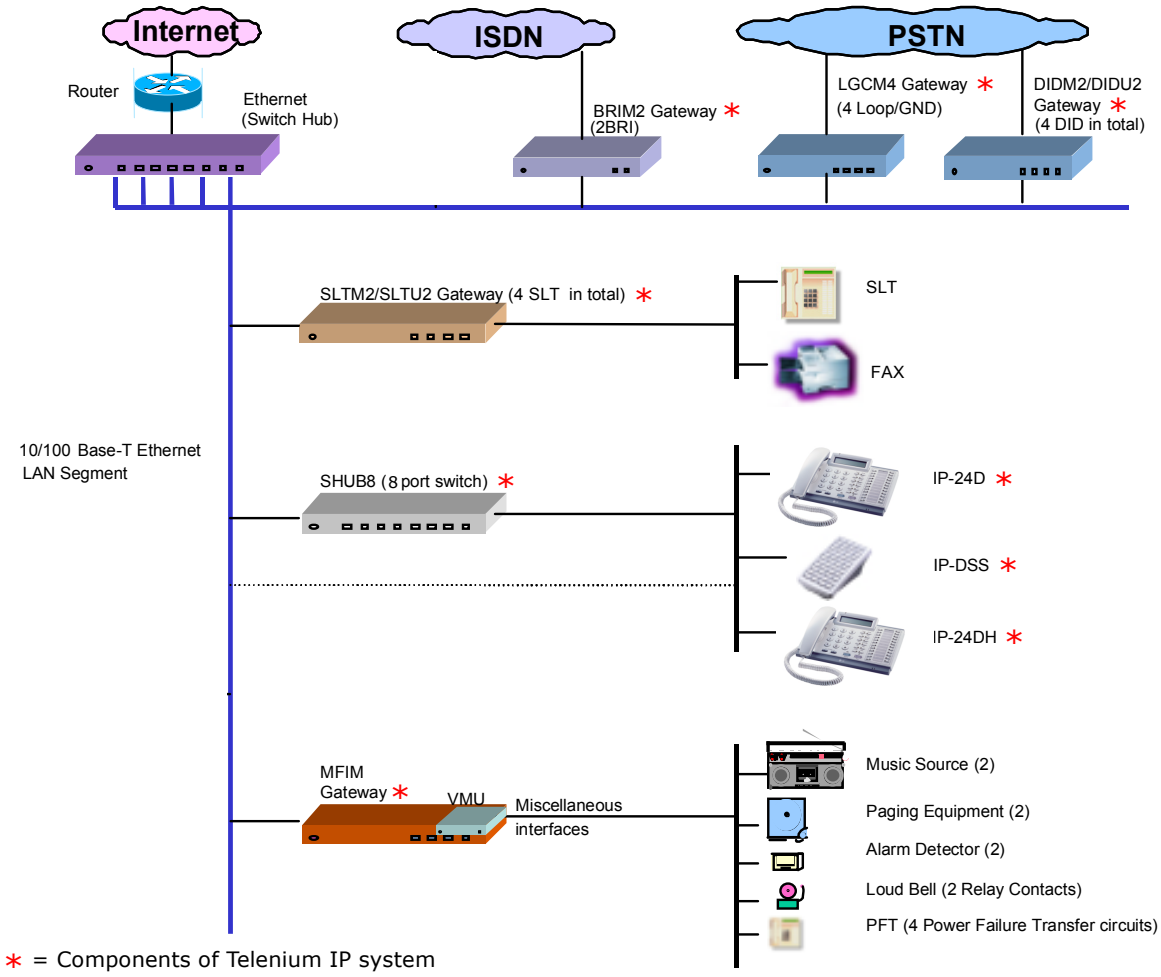


Figure 1-1: Network Configuration Diagram

Equipment Part Numbers

The following table lists the basic and optional parts used with the *Telenium*^{IP} system. A detailed description of each part is provided in *Chapter 2*.

Part Number	Description	Short Title
GATEWAYS AND MODULES		
3830-00	IP Multifunction Internet Protocol Gateway Module	MFIM
3830-30	DID Gateway Module (2 port)	DIDM2
3830-31	DID Gateway Module Upgrade (2 port)	DIDU2
3830-40	PSTN Gateway Module (4 Loop Start)	LGCM4
3831-41	ISDN Gateway Module (2 BRI)	BRIM2
3832-01	Power Switch (8 port) – network switch (provides power to IP phones)	SHUB8
3833-00	SLT Gateway Module (2 port)	SLTM2
3833-02	SLT Gateway Module Upgrade (2 port)	SLTU2
CABINET MOUNTING HARDWARE		
3800-00	IP Main Cabinet Kit (includes P/N 3800-01, 3800-02, and 3800-03)	MCAB KIT
3800-01	IP Main Cabinet	MCAB
3800-02	IP Main Cabinet Window (clear acrylic door)	MCAB WIN
3800-03	IP Power Box	PWBX
3800-40	IP Data Rack Bracket Kit	RBRK KIT
3800-41	IP Main Cabinet Data Rack Bracket	RBRKM
3800-42	IP Powerbox Data Rack Bracket	RBRKP
3800-20	Pedestal Base Kit with Foot	FOOT KIT
3800-21	Pedestal Foot	FOOT
3800-30	Wall Mount Bracket	WBRKM
GATEWAY MOUNTING HARDWARE		
3801-00	IP Desktop Mount	DHLD
3801-01	IP Desktop Mount Extender	DHE
3815-00	Single-Device Gateway Wall Mount	WHLD
KEYSETS		
3810-00	IP 48-Button DSS/BLF Console	IP-DSS
3813-00	IP Phone Wall Mount	
3813-01	24-Button LCD Key Telephone Unit (KTU) (1 port)	IP-24D
3813-02	24-Button LCD Key Telephone Unit (KTU) (2 port)	IP-24DH
POWER ADAPTERS		
3871-00	IP Gateway Power Adapter	GW PWR
3871-01	IP Phone Power Adapter	IPPHONE PWR

System Specifications

System Capacity

Description	Capacity
Alarm/Door Bell Inputs	2
Attendants	4
Authorization Codes	200
CO Line Groups	20
DSS Consoles per Station	2
Executive/Secretary Pairs	10
External Control Relays	2
External Page Zones	2
Hunt Group Members	70
Hunt Groups	40
Internal Page Zones	10
Last Number Redial Bins per Station	10 (48 digits/bin)
Main Cabinet Slots	10
Music Source Inputs	2
Power Fail Circuits	4
PSTN Circuits *	42
Save Number Redial	1 (48 digits)
Serial Port (RS-232C)	2
SMDR Buffer	20000
Station Speed Dial Bins per Station	20 (48 digits/bin)
Stations *	70
System Speed Dial Bins	800 (48 digits/bin)
System Speed Dial Groups	10

** The station and CO Line maximums are not simultaneously achievable. Cumulative maximum Sta and CO Lines = 96 ports.*

Dimensions and Weights

Item	Height (mm/in)	Width (mm/in)	Depth (mm/in)	Weight (kg/lbs)
DHLD	146/5.7	111.5/4.4*	128/5	0.4/0.8
FOOT	101.1/4.0	436.6/17.2	310/12.2	1.0/2.2
Gateway Module	230/9.1	194.5/7.6	38.8/1.5	1.5/3.3
IP Keyset (IP-24D, IP-24DH)	86.4/3.4	269/10.6	196/7.7	0.92/2.0
IP-DSS Console	162/6.4	98/3.9	86.4/3.4	0.3/0.65
MCAB	308.4/12.1	436.6/17.2	310/12.2	9.0/19.8
PWXB	124.7/4.9	436.6/17.2	310/12.2	6.0/13.2
WBRK	45.0/1.8	458.6/18.1	312.6/12.3	1.7/3.7
WHLD	280/11.0	60/2.4	188.3/7.4	0.2/0.4
** Width of Desk Mount does not include approximately 40mm/3.2inches for each installed module.*				

Electrical Specifications

Item	Specification
External Paging Port	0dBm @600ohm
External Relay Contact	2amp @ 30 VDC
Gateway Power Adapter (AC/DC)	
AC Power	100-240VAC, +/- 10% @50/60Hz
AC Voltage Input	1.0 amps
DC Output Voltage	48 VDC @ 0.8 amps
IP Phone Power Adapter (AC/DC)	
AC Voltage Input	100-240 VAC, +/- 10% @50/60Hz
AC Power	0.2 amps
DC Output Voltage	48 VDC @ 0.1 amps
LAN Power Feed	48VDC @ 0.3 amps max
Music Source Input	0dBm @600ohm
Power Box	
AC Voltage Input	100-240VAC, +/- 10% @50/60Hz
AC Power	10 Amp circuit
Fuse	T10A, AC250V

Environmental Specifications

Item	Degrees (C)	Degrees (F)
Operation Temperature	0-40	32-104
Optimum Operation Temperature	20-26	68-78
Storage Temperature	10-70	32-158
Relative Humidity	0-80% non-condensing	

Maximum Station Distance from Gateway Module

Item	AWG 22 (m/ft)	AWG 24 (m/ft)
H.323 VoIP Telephone	100 / 328*	
IP Keyset	100 / 328*	
Single Line Telephone	6,000 / 20,000	4,000 / 13,000
* = *UTP Category 5 Cables*		

CO Loop Specification

Item	Specification
DTMF Dialing	
Frequency Deviation	Less than +/- 1.5 %
Signal Rise Time	Max. 5ms
Tone Duration, on time	Min. 50ms
Inter-digit Time	Min. 45ms
Pulse Dialing	
Pulse Rate	10 pps
Break/Make Ratio	60/40% or 67/33%
Ring Detect Sensitivity	40Vrms @ 16-30Hz
	30Vrms @ 30-37Hz

2 System Components

This chapter provides the following detailed information relating to the *Telenium*^{IP} system hardware components:

- System Module Descriptions
- Switch and Connector Positions
- IP Keyset Capabilities and Functions

IP Modules

MFIM

The "Multi-Function & Internet Protocol gateway Module" (MFIM) is the main controller for the *Telenium*^{IP}. The MFIM contains two processors to support complex features. A main processor manages and controls all the functions of the *Telenium*^{IP}, such as module handling, IP Keyset handling and call processing. The sub-processor handles the miscellaneous features of the system, such as external paging, internal and external background music, alarm sensing, relay control and power fail transfer. The MFIM, employing the IP Key Telephone System protocol, extends its telephony resources and call processing to the *Telenium*^{IP} modules and terminals connected to the *Telenium*^{IP} Zone (LAN).

A Telenium IP Zone is a concept identified as a set of Telenium IP devices on a network that make up one particular Telenium IP system. Multiple zones can exist on a single network without conflicting with each other.

The MFIM incorporates miscellaneous interfaces for Music-On-Hold (MOH), Background Music (BGM), contact monitors for Alarm and Doorbell inputs, Loud Bell Contacts, and Power Fail Transfer (PFT) relays.

The MFIM comes with a voice storage medium used by the Automated Attendant and Voice Mail services available in the *Telenium*^{IP} software. The MFIM has a voice storage capacity of approximately 200 minutes.

The MFIM incorporates an IP Gateway for access to standards based (H.323 v2) Voice over IP (VoIP) communications networks. The MFIM supports up to 6 simultaneous full duplex packet voice channels employing G.711 voice encoding.

The MFIM includes two Ethernet ports and two MACs for the 10/100 Base-T Ethernet interface as well as packet voice processing functions. One Ethernet port is dedicated to the master processor, and the other is dedicated to the sub-processor for miscellaneous features.

The MFIM includes battery back-up circuitry using a long-life Lithium battery to prevent system database loss during power fail. For more details, refer to *"MFIM Installation" on page 3-20*.

Front Panel

The front panel of the MFIM has:

Power jack for the AC/DC adapter supplied with the MFIM

Power status LED

RCA jack for one music (audio) source -BGM1

One RJ-45 Female LAN connector for master processor with Speed and Link/Activity LEDs

One RJ-45 Female LAN connector for sub-processor with Speed and Link/Activity LEDs

Four-position DIP-switch for mode selections

Ten LEDs:
Five red LEDs display the operating status of the main processor
Five green LEDs display the operating status of MISC functions

Reset Switch

Two DB-9 RS-232 connectors

Rear Panel

On the rear panel, the MFIM has:

Eight RJ-11 female connectors: for Alarm, BGM/MOH, Control Relay inputs, External Page outputs, and Power Fail Transfer circuits.

Ground Lug

64-pin back plane connector. All signals on RJ-11 connectors are matched on the 64-pin back plane connector.

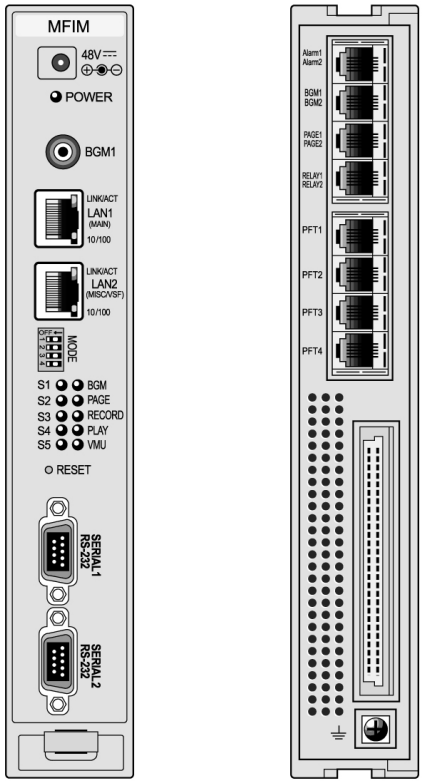


Figure 2-1: MFIM Front & Rear Panels

LGCM4

The four port Loop/Ground CO gateway Module (LGCM4) provides four CO/PBX Loop/Ground Start Line interfaces. These interfaces support pulse or DTMF dial signals. Each Interface contains ring and loop current detection circuits, speech codec and compression functions, and loop and ground signaling circuits. The circuitry and software support "Call Progress Tone" and DTMF tone detection to support features such as Call Metering, Automatic Redial, etc.

The LGCM4 includes the Ethernet port and MAC for the 10/100 Base-T Ethernet interface as well as packet voice processing functions.

Front Panel

The front panel of the LGCM4 has:

Power jack for the AC/DC adapter supplied with the LGCM4

Power status LED

Normal/Service Switch – in the Service mode, circuits in use are busied as they return to idle

RJ-45 Female LAN connector with Speed and Link/ Activity LEDs

Four LEDs, one for status of each CO line

DB-9 RS-232 connector

Reset Switch

Rear Panel

On the rear panel, the LGCM4 has:

Four RJ-11 female connectors, one for each CO Line

Ground Lug

50-pin back plane connector. All signals on RJ-11 connectors are matched on the 50-pin back plane connector.

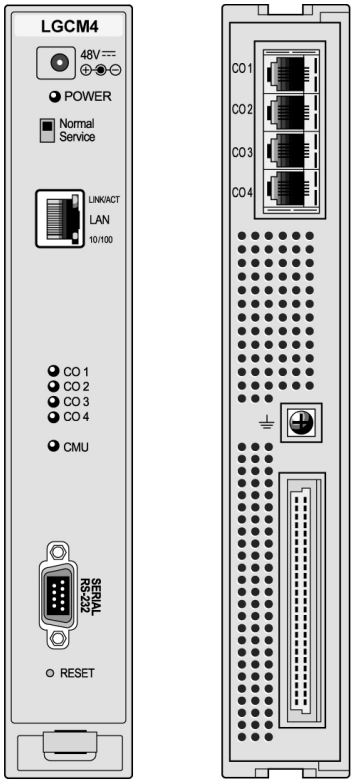


Figure 2-2: LGCM4 Front & Rear Panels

DIDM2 & DIDU2

The two port Direct-In-Dial gateway Module (DIDM2) provides interfaces to PSTN Direct-In-Dial Lines, supporting wink or immediate start signaling. These lines are incoming only and send the last few digits of the dialed number to identify a particular extension/user in the system.

The DIDM2 provides interface circuitry for two DID Lines. The DIDM2 can be expanded with the DIDU2 to provide four interface circuits in total. Each interface is equipped with appropriate speech codec and compression functions, pulse and DTMF dial signal detection.

The DIDM2 includes the Ethernet port and MAC for the 10/100 Base-T Ethernet interface as well as packet voice processing functions.

Front Panel

The front panel of the DIDM2 has:

- Power jack for the AC/DC adapter supplied with the DIDM2
- Power status LED
- Normal/Service switch – in the Service mode, circuits in use are busied as they return to idle
- RJ-45 Female LAN connector with Speed and Link/Activity LEDs
- Four DID LEDs, one for status of each DID Line
- One DIDU LED, indicating the two-port expansion module (DIDU2) is installed
- DB-9 RS-232 connector
- Reset Switch

Rear Panel

On the rear panel, the DIDM2 has:

- Four RJ-11 female connectors, one for each DID Line (w/DIDU2 installed)
- Ground Lug
- 50-pin back plane connector. All signals on RJ-11 connectors are matched on the 50-pin back plane connector.

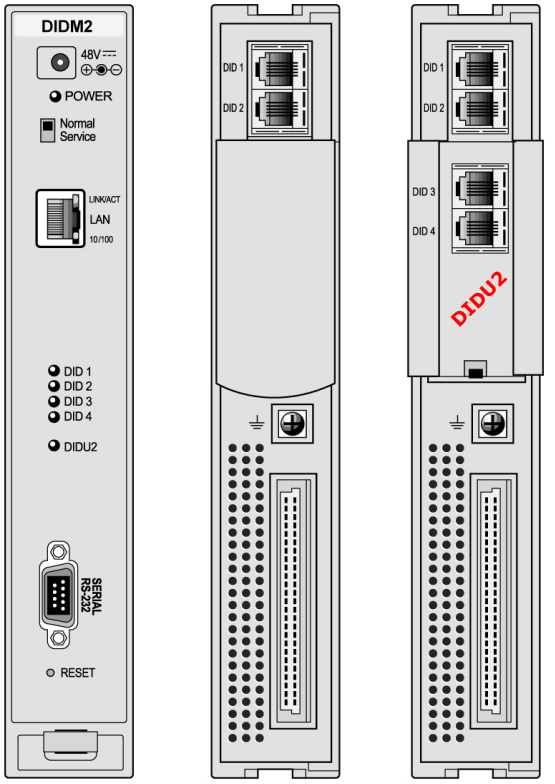


Figure 2-3: DIDM2 Front & Rear Panels

SLTM2 & SLTU2

The two-port Single Line Telephone Module (SLTM2) allows standard analog Single Line Telephone (SLT) devices access to CO Lines, other stations, and most features of the system through the use of "dial codes".

The SLTM2 provides interface circuitry for two SLTs. The SLTM2 can be expanded with the two-port Single Line Telephone Unit (SLTU2) to provide four interface circuits in total. Each interface is equipped with appropriate speech codec and compression functions, 48 volt DC feed circuit, pulse and DTMF dial signal detection. A ring generator and message wait source are integrated in the SLTM2.

The SLTM2 includes the Ethernet port and MAC for the 10/100 Base-T Ethernet interface as well as packet voice processing functions.

Front Panel

The front panel of the SLTM2 has:

- Power jack for the AC/DC adapter supplied with the SLTM2
- Power status LED
- Normal/Service switch – in the Service mode, circuits in use are busied as they return to idle
- RJ-45 Female LAN connector with Speed and Link/Activity LEDs
- Four SLT LEDs, one for status of each SLT
- Four MSG LEDs, one each for Message status to each SLT
- One SLTU LED, indicating the two-port expansion unit, SLTU2, is installed
- DB-9 RS-232 connector
- Reset Switch

Rear Panel

On the rear panel, the SLTM2 has:

- Four RJ-11 female connectors, one for each SLT (shown w/SLTU2 installed)
- Ground Lug
- 50-pin back plane connector. All signals on RJ-11 connectors are matched on the 50-pin back plane connector.

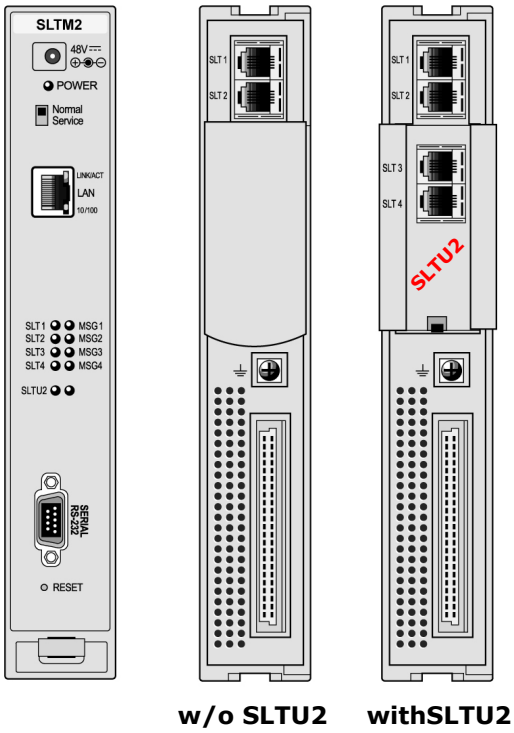


Figure 2-4: SLTM2 Front & Rear Panels

BRIM2

The Basic Rate Interface gateway Module (BRIM2) has two ISDN Basic Rate Interface ports (2B+D). This Gateway Module supports the 'S/T interface' as described by ETSI 300.012 based on the ITU-T Recommendations I.430, and can be installed in the NT (**N**etwork **T**ermination) or TE (**T**erminal **E**quipment) mode.

The BRIM2 includes the Ethernet port and MAC for the 10/100 Base-T Ethernet interface as well as packet voice processing functions.

Front Panel

The front panel of the BRIM2 has:

Power jack for the AC/DC adapter supplied with the Module 2

Power status LED

Normal/Service switch – in the Service mode, circuits in use are busied as they return to idle

RJ-45 Female LAN connector with Speed and Link/Activity LEDs

Ten LEDs, various status LEDs - five for each BRI Line

DB-9 RS-232 connector

Reset Switch

Rear Panel

On the rear panel, the BRIM2 has:

Two RJ-11 female connectors, one for each BRI Line

Two, four- position DIP-switches for setting termination mode and power feed options for each BRI Line

Ground Lug

50-pin back plane connector. All signals on RJ-11 connectors are matched on the 50-pin back plane connector.

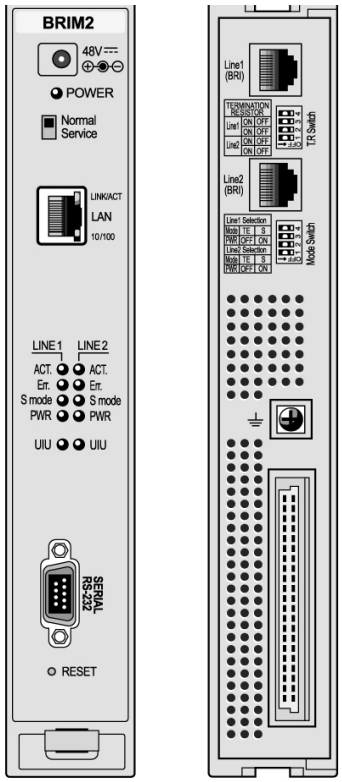


Figure 2-5: BRIM2 Front & Rear Panels

SHUB8

The Switching Hub Module (SHUB8) has eight LAN ports and an UPLINK LAN port, all of which employ Ethernet switching. All ports support Auto-sense 10/100Mbps and half/full duplex mode. The SHUB8 is a standard nine-port Ethernet switch, which switches packets between two specified ports. Unlike a repeater that repeats each packet to all ports, using the SHUB8 minimizes traffic over each port as well as the overall LAN environment.

The eight LAN ports of SHUB8 are equipped with circuitry to provide power (48 VDC) to the IP Keyset or DSS console through the LAN cable. The power-feed circuitry is controlled manually by a DIP-switch on the front of the SHUB8. Note the UPLINK LAN port is not equipped with the power feed circuitry.

***Caution**: The power feed provided by the SHUB8 will cause damage to other LAN devices. Prior to switching any of the DIP-switches "ON", assure that only an IP Keyset or DSS console is connected to the SHUB8 switched LAN port.*

Front Panel

The front panel of the SHUB8 has:

- Power jack for the AC/DC adapter supplied with the SHUB8
- Power status LED
- Eight-position DIP-switch, controls power to each of the eight hub ports
- RJ-45 Female "UPLINK" LAN connector with Speed and Link/Activity LEDs
- Eight RJ-45 Female LAN connectors with Speed and Link/Activity LEDs, one per port

Rear Panel

On the rear panel, the SHUB8 has:

- DB-9 RS-232 Serial port connector
- Ground Lug
- 50-pin back plane connector.

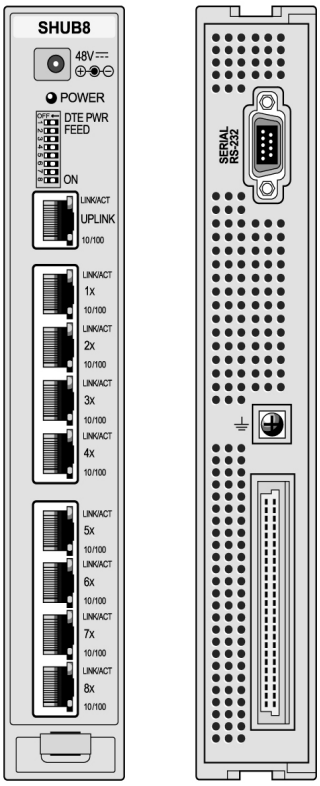


Figure 2-6: SHUB8 Front & Rear Panels

IP Module - AC/DC Adapter

Each module is packaged with an AC/DC adapter. The adapter is supplied with a two-meter (six-foot) AC cord terminated with the nationally relevant AC blade type. The adapter supports AC input power systems with rated voltage range of 100-240 VAC @ 50/60 Hz. The adapter provides 48 VDC at 0.8 amps. The DC output connector is cabled to the adapter with a two-meter (six-foot) cable as shown in the following illustration.

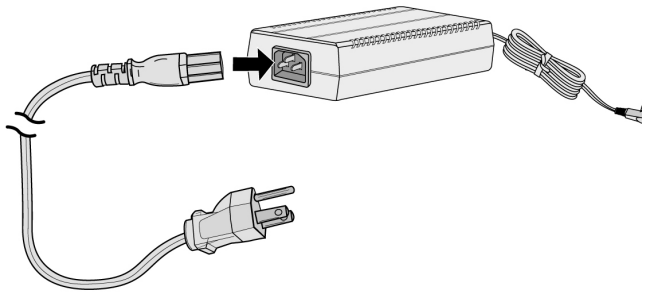


Figure 2-7: AC/DC Adapterfor IP Module

IP Keysets

The *Telenium*^{IP} will work with a number of telephone types including standard SLTs via SLTM2 and the IP Keysets. The IP Keyset is available in the following configurations:

Table 2-8: IP Keyset Models

Model	Description
IP-24D	IP Phone 24BTN Display
IP-24DH	IP Phone 24BTN Display w/Switched Hub port
IP-DSS	IP Phone Direct Station Selection

LAN Ports

There are two IP Keyset models (IP-24D and IP-24DH) and a DSS console.

The IP-24D has a single LAN port for connecting to the external 10/100 Base-T LAN.

The IP-24DH model has two LAN ports and thus two RJ-45 connectors. One port is for connecting to the LAN. The other can be connected to the network-ready PC. The ports are connected to an intelligent 10/100Base-T switch, which gives LAN access to the data device while giving priority to voice packets.

DSS Console

IP-DSS, which is used to expand the number of Flexible buttons available to a user by 48 buttons, has a single LAN port. When the console is locally powered with the AC/DC Adapter, the IP DSS can be connected to the 2nd LAN port of the IP-24DH.

Fixed/Flexible Buttons

Each IP Keyset has a standard 12-button dial-pad, color coordinated handset, an array of 24 "Flexible buttons", and 16 Fixed Feature Access keys. All of the Flexible and Fixed buttons, except the Volume controls, incorporate a long-life, super-bright LED to indicate the circuit or feature status.

The fixed feature access keys are the same for all IP Keysets and include the following:

- TRANS – transfer
- REDIAL
- FWD – Call Forward
- CONF - Conference
- DND – Do-Not-Disturb
- CALL BK – Call back
- MUTE
- FLASH/MSG – CO Line Flash and Message Wait
- ICM – Intercom
- PGM – Program
- SPEED – Speed Dial
- SAVE
- SPEAKER
- HOLD
- VOLUME up
- VOLUME down

Features

The IP Keyset circuitry includes Digital Signal Processing to implement packet voice encoding and decoding, and echo cancellation as well as tone generation and speakerphone operation. The Volume controls, which consist of separate volume up down buttons, adjust the level of the handset as well as the speaker.

The IP Keyset includes a 2-line, 48-character (24 characters per line), Liquid Crystal Display (LCD). The LCD provides an alphanumeric display to assist the user in operation of features. In the idle mode, the display will show the station name or number on the top line and the time and date on the 2nd line. The LCD is employed to support features such as Dial-By-Name (Directory Dial) using the Volume control to scroll through name displays to find a telephone number in the directory.

The IP Keyset may be powered locally with the Keyset AC/DC Adapter, refer to *page 2-10*, or powered over the LAN with the SHUB8. If both the AC/DC Adapter and powered LAN port are connected to the IP Keyset, the Adapter will provide the required power.

Using the available Wall Mount Kit, the IP Keysets can be mounted on a wall as shown in the following keyset illustrations. *NOTE*: the IP-DSS is not wall-mountable.

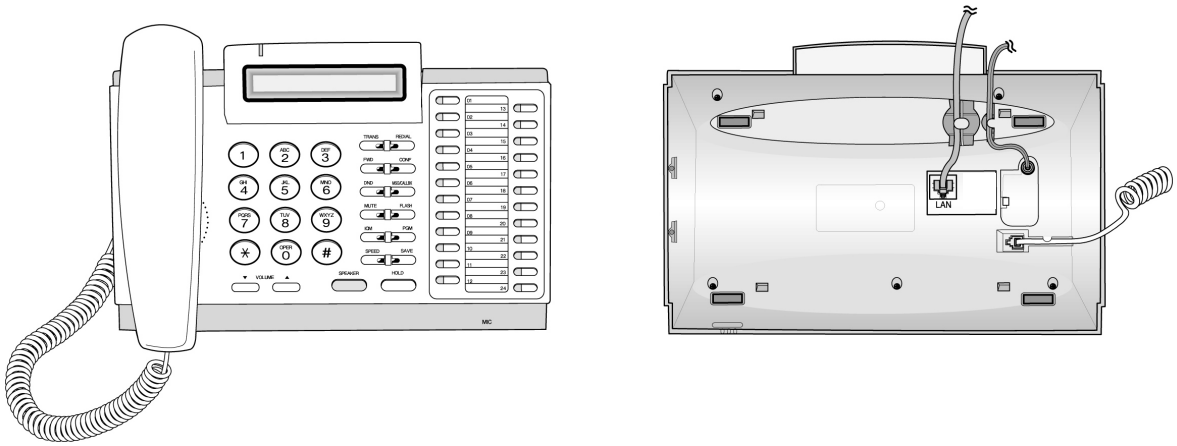


Figure 2-9: IP-24D Keyset

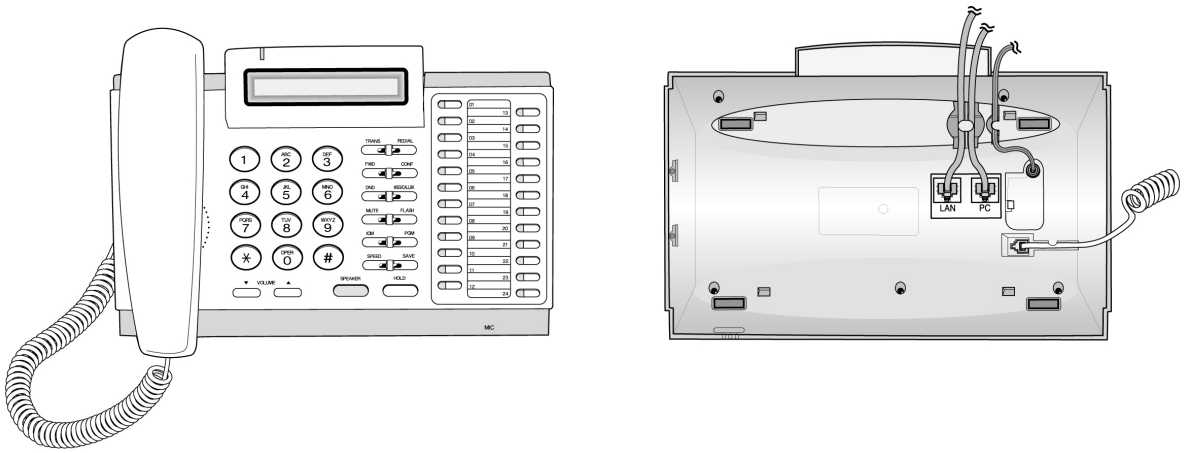


Figure 2-10: IP-24DH Keyset

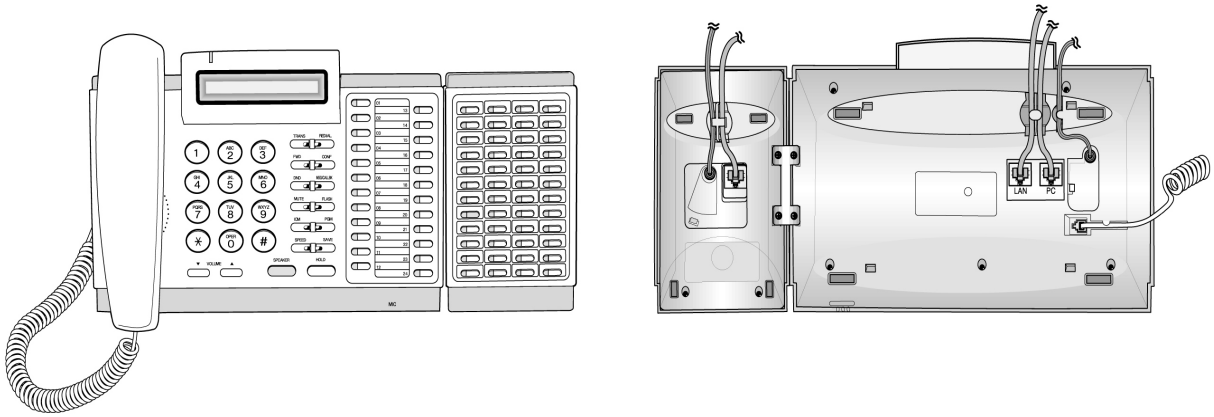


Figure 2-11: IP-24DH Keyset with DSS Console

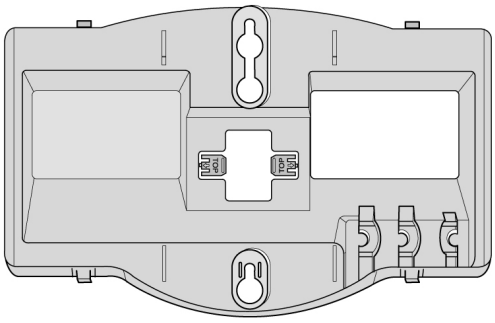


Figure 2-12: Wall Mount for IP Keysets

IP Keyset AC/DC Adapter

When an IP Keyset or DSS is to be powered from local AC (not provided power over the LAN), a separate AC/DC adapter must be used for power. The adapter is supplied with a ten-foot AC cord terminated with the nationally relevant AC blade type. The adapter supports AC input power systems with rated voltage range of 100-240 VAC @ 50/60 Hz. The adapter provides 48 VDC at 0.1 amps. The DC output connector is cabled to the adapter with a ten-foot cable.

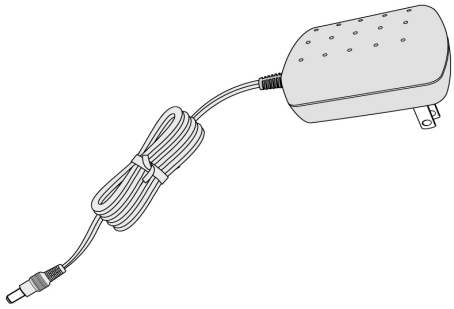


Figure 2-13: AC/DC Adapter for Keyset

Module Mounting Hardware

The *Telenium*^{IP} modules and Cabinet can be installed in a variety ways:

- Desk mounted using the **Desk Mount Holder**,

  -or-

- Wall mounted individually using the **Wall Mount Holder**,

  -or-

- Cabinet installed using the **Main Cabinet**, which can be 19" Rack-, Desk-, or Wall-mounted.

Desk Mount Holder

The Module Desk Mount Holder (DHLD) consists of a pair of "bookends" and Desk Mount Holder Extender (DHE). One Extender is installed between the bookends for each module, and the module is mounted between the bookends.

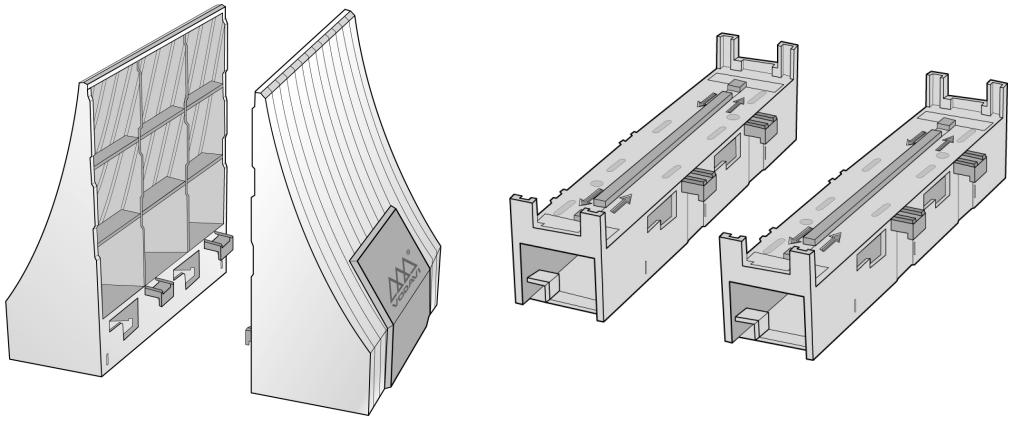


Figure 2-14: Desk Mount Holder & Extenders

Wall Mount Holder

The *Telenium*^{IP} modules can be wall-mounted using the Wall Mount Holder (WHLD). The WHLD provides wall mounting for a single module.

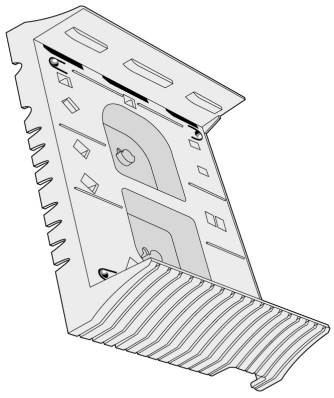


Figure 2-15: Module Wall Mount Holder

Main Cabinet

The *Telenium*^{IP} Main Cabinet (MCAB) has ten slots for modules. The front panel of the Cabinet is made of a translucent plastic to permit easy viewing of the various status LEDs on the installed modules. The "window" front panel is hinged to open freely and incorporates a turnkey, which can be locked to minimize unauthorized access.

Any module can be installed in any of the first nine slots; slot ten is reserved for the MFIM only. The back plane distributes the telephony terminations to the appropriate RJ-21x connectors mounted on the back plane. LAN connections are made along with power on the front of each module.

Cabinet Mounting Options

There are three types of mounting hardware available that allows the Cabinet to be mounted in a 19" rack, on a desk top, or on a wall. With the Rack or Desk mount installation; removing the rear panel of the Main Cabinet accesses the RJ-21X connectors on the back plane. In the Wall mount installation, the Cabinet is connected to the Wall Mount using a hinge, which allows the Cabinet to swing open for removal of the rear panel allowing access to the RJ-21X connectors on the back plane.

The 19" Rack, Desk and Wall Mount hardware are shown in the respective illustrations.

Rack Mount

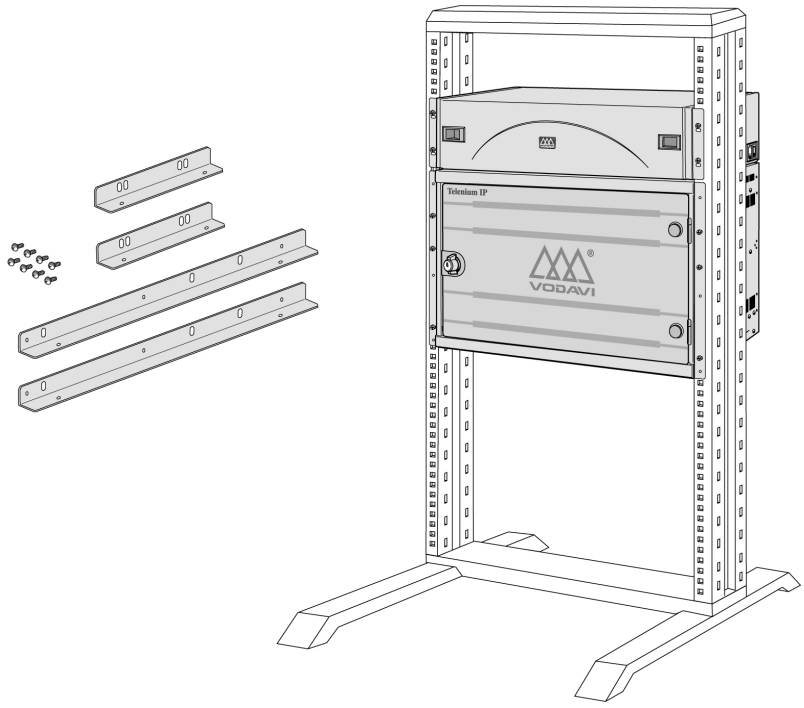


Figure 2-16: 19" Rack Mount Installation

Desk Mount

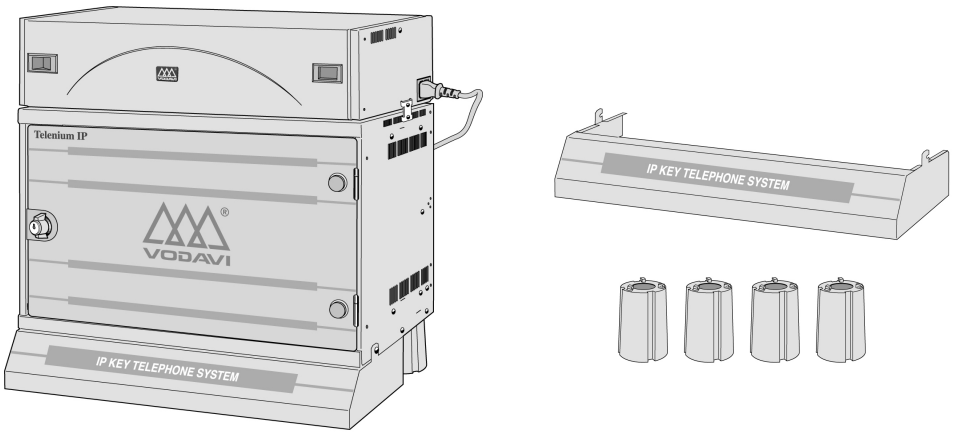


Figure 2-17: Desk Mount Installation

Wall Mount

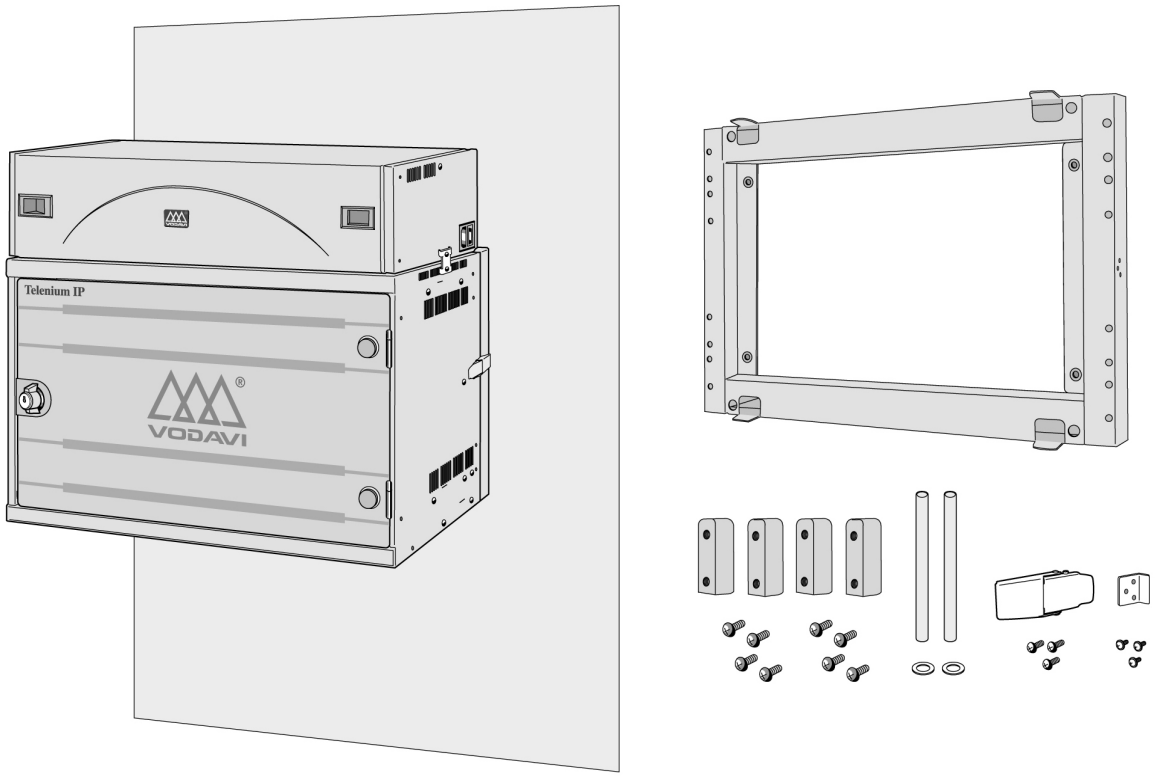


Figure 2-18: Wall Mount Installation

Power Box

A Power Box (PWBX) may be installed to house the AC/DC adapters for the *Telenium*^{IP} Modules. The Power Box is attached to the Main Cabinet with small brackets. The Power Box design incorporates ten slots for module AC/DC adapters.

An AC power strip with ten short AC cables for connection to individual modules, a thermostat controlled cooling fan, a 15-amp 250 V time-lag fuse (T10A, AC250V), and a two-meter (six-foot) power cord for connection to local AC power are all included in the power box.

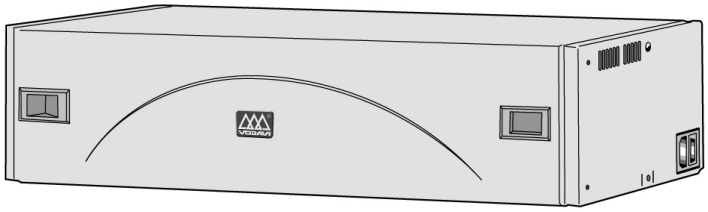


Figure 2-19: Power Box

3 Installation

This chapter provides information regarding installation of modules and other related equipment.

Introduction

Recommended installation proceeds in six major steps:

- Site preparation
- Equipment verification
- Cabinet/Desk/Wall Mount Holder installation, as required
- Module installation and wiring
- IP Keyset and other terminal installation
- System programming and verification

Directions for system programming and verification are provided in the *Telenium*^{IP} System Programming Manual.

Site Preparation

General Site Considerations

The first step is to locate an acceptable site for the Module mounting hardware (Desk Mount Holder, Wall Mount Holder or Main Cabinet). When locating the mounting site, the following points must be considered:

- The Main Cabinet can be Desk-, 19” Rack-, or Wall-mounted. When desk mounting, assure that the desk has ample strength to support the Main Cabinet and other hardware to be installed.
- When wall mounting is desired, the Cabinet **MUST NOT** be mounted directly to a masonry or plasterboard wall. A 1/2-inch plywood backboard should be firmly attached to the wall, and the Cabinet should be mounted to the backboard.
- The location must have access to an appropriate 100-240 VAC @ 50-60 Hz power source with a circuit breaker or fuse rated at 10 amps and must be surge protected. An appropriate grounded outlet should be within approximately 2 meters (6 feet) of the equipment location. When employing the Module Desk Mount Holder, an outlet will be required for each Module; a multi-outlet extension cord or the *Telenium*^{IP} Power Cabinet may be used.
- The location must have access to a good earth ground, such as a metallic cold water pipe with no non-metallic joints. The ground source should be located as close as possible to the equipment.
- The system should be located in a well-ventilated area with a temperature of approximately 20^0C (68^0F) and a relative humidity of 0-80% (non-condensing).
- The equipment should be located within 8 meters (25 feet) of the telephone company's termination point. If the system is to share the LAN with data devices or be connected to an external VoIP network the system must be within 100 meters (328 feet) of the WAN connection. Also, the location should be within the prescribed station loop lengths for all IP Keysets and terminals (100 meters/328 feet). If existing cabling is to be employed, the location of existing cabling and conduits should be considered.
- The location should have adequate accessibility, space and lighting for future servicing and should consider the need for future expansion.
- The site should be away from radio transmitting equipment, arc-welding devices, copy machines, and other electrical equipment capable of generating high levels of electrical interference. The system should be protected from flooding and heavy machinery as well as excessive dust and vibration.

Verify Equipment On-site

Once the equipment installation site has been identified and a dedicated AC outlet, earth ground, lighting and ventilation are available, verify that all equipment and tools required are on-site and the equipment has not been damaged during shipment. Check that the type and quantity of Modules and terminals received are correct. Also assure optional equipment and a Power Line Surge Protector are on-site.

Module Mounting Hardware Installation

Main Cabinet Installation

The *Telenium*^{IP} Main Cabinet can be desk, 19” rack or wall mounted. The following paragraphs provide directions for each of the mounting options.

Cabinet Pedestal Kit Installation

An optional Pedestal kit is available for the Main Cabinet. This kit must be installed when the Main Cabinet is to be floor mounted to assure adequate ventilation. The four Pedestal feet are mounted to each bottom corner of the Cabinet. A wiring tray is mounted on the lower front of the Main Cabinet.

To desk mount the Cabinet:

1. Insert the Foot into the foot-hole at each bottom corner of the Cabinet and rotate each Foot clockwise until locked securely.
2. Loosen the two screws at both sides of the Cabinet.
3. Slide the Wiring tray over the two screws and re-tighten securely.

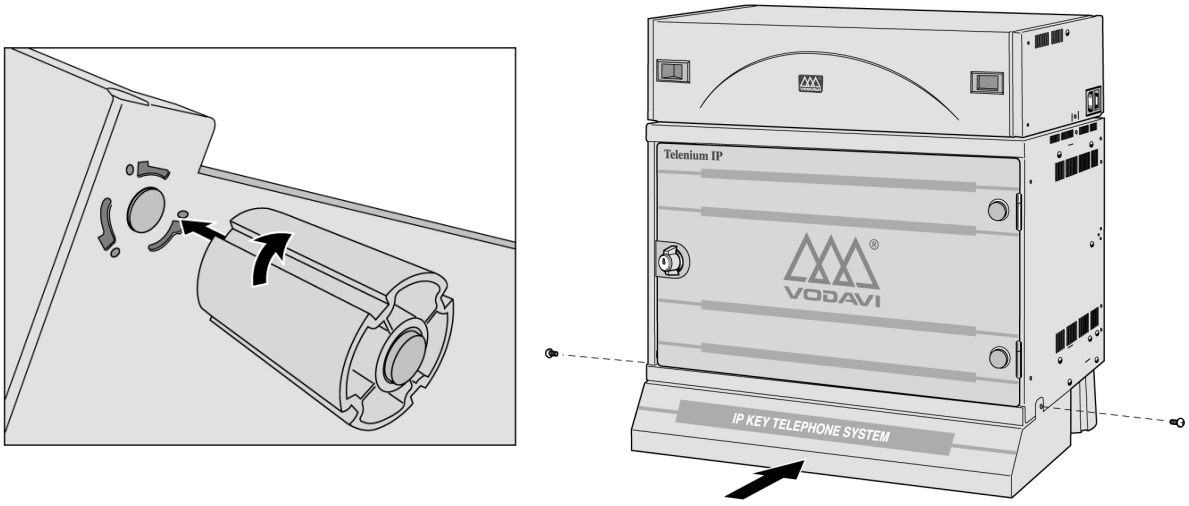


Figure 3-1: Cabinet Pedestal Kit

Cabinet 19” Rack Installation

Rack mount brackets are provided as standard equipment with the Main Cabinet. These brackets attach to the front sides of the Main Cabinet.

To rack mount the Main Cabinet:

1. Bolt the Rack mount brackets securely onto the sides of the Cabinet with the four supplied M4 x 6 mm machine screws, nuts, and washers.
2. Connect the brackets securely to a standard 19” rack with four appropriate machine screws, nuts, and lock-washers.

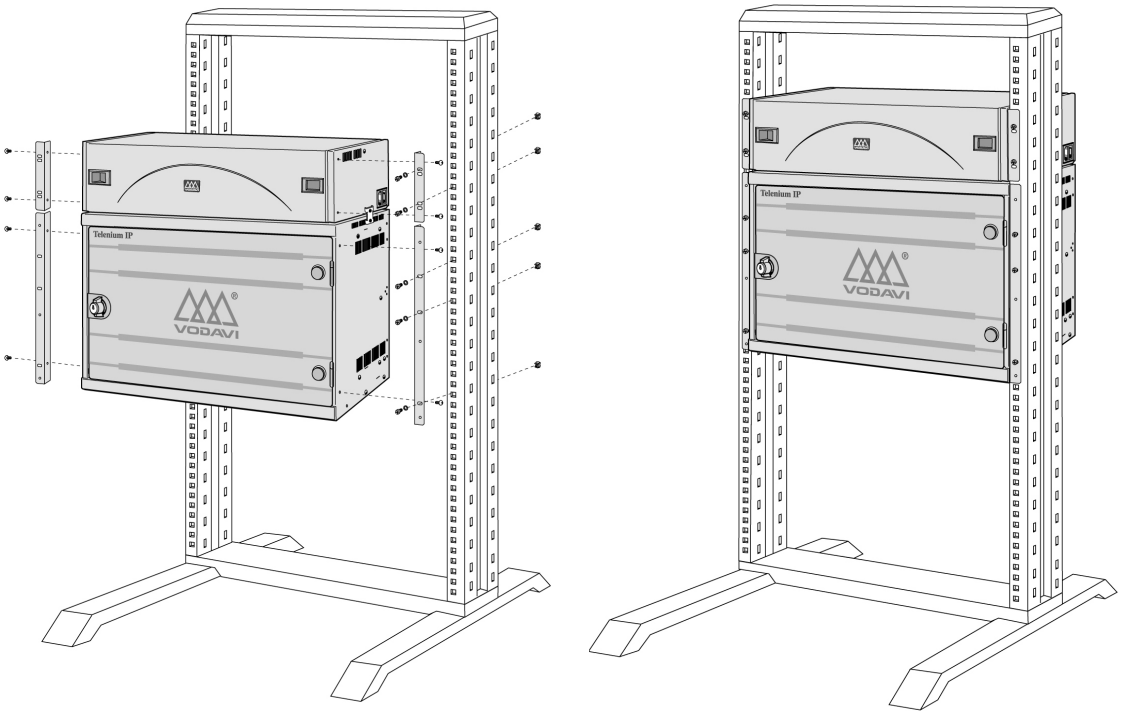


Figure 3-2: Rack 19" Installation

Cabinet Wall Mount Kit Installation

If the Main Cabinet is to be wall mounted, a wooden backboard **MUST** be installed when the location has masonry or plasterboard walls. This backboard is recommended for all wall mount installations. A 1/2-inch plywood material is sufficient for most installations. The backboard should be mounted at a convenient height, about one meter above the floor, and be bolted to wall-studs in a number of places to distribute the weight of the system.

Space should be available on the backboard for separate Telephone and LAN wiring main distribution frames and for optional equipment such as music sources, etc.

The optional Cabinet Wall Mount kit mounts to the wall then the Main Cabinet is attached to the Wall Mount kit. The Wall Mount kit permits the cabinet to swing on a Hinge for access to the backplane telephony cabling. The Hinge may be placed on either side of the Cabinet prior to installation. Select the Hinge side so as to obtain maximum clearance and lighting.

Follow the steps below for installation.

1. Remove the Hinge pin from the Hinge plates.
2. Mount the separated Hinge plates, one to the Wall Mount bracket and one to the Main Cabinet using the M6 x 8 mm machine screws, nuts and washers (four for each Hinge plate) provided.
3. Use the Wall Mount kit to mark the location of four mounting holes for the Wall Mount kit.
4. Drill four pilot holes for 7 mm x 38 mm (#10x1.5 inch) or larger screws.
5. Insert the screws in all four pilot holes and tighten, leaving about 12 mm (1/2 inch) exposed.
6. Place the Wall Mount kit on the four screws and tighten the screws securely.
7. Mount the Main Cabinet to the Wall Mount kit by aligning the Hinge plates and inserting the Hinge pin.

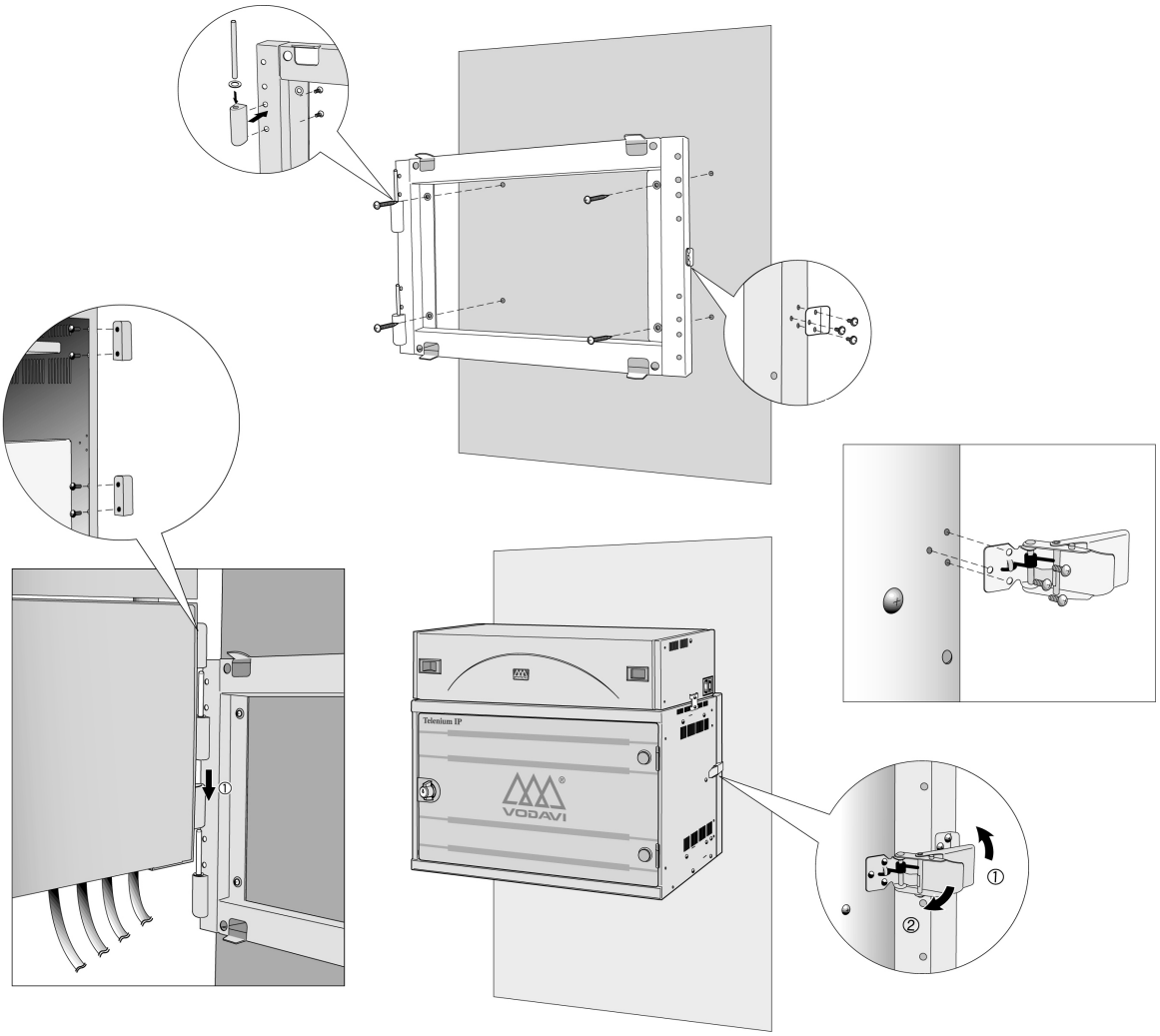


Figure 3-3: Cabinet Wall Mount Kit Installation

Power Box Installation

The Power Box is designed for Desk or Main Cabinet mounting. To mount the Power Box to the Main Cabinet, install two brackets with the four self-tapping M4 x 6 mm screws. These screws must be tightened securely as they also provide for grounding of the cabinet.

AC/DC Adapters are held in place with a hold-down bracket inside the Power Cabinet.

To install an Adapter:

1. Remove the cover from the Power Box.
2. Loosen the hold-down bracket screws.
3. Insert Adapter in the appropriate slot, assure the DC feed cable is free and at the front of the Cabinet.
4. Connect the short AC cord to the adapter and Power Box outlet.
5. While applying a slight downward force on the hold-down bracket, tighten the screws.
6. Replace the Power Cabinet cover.

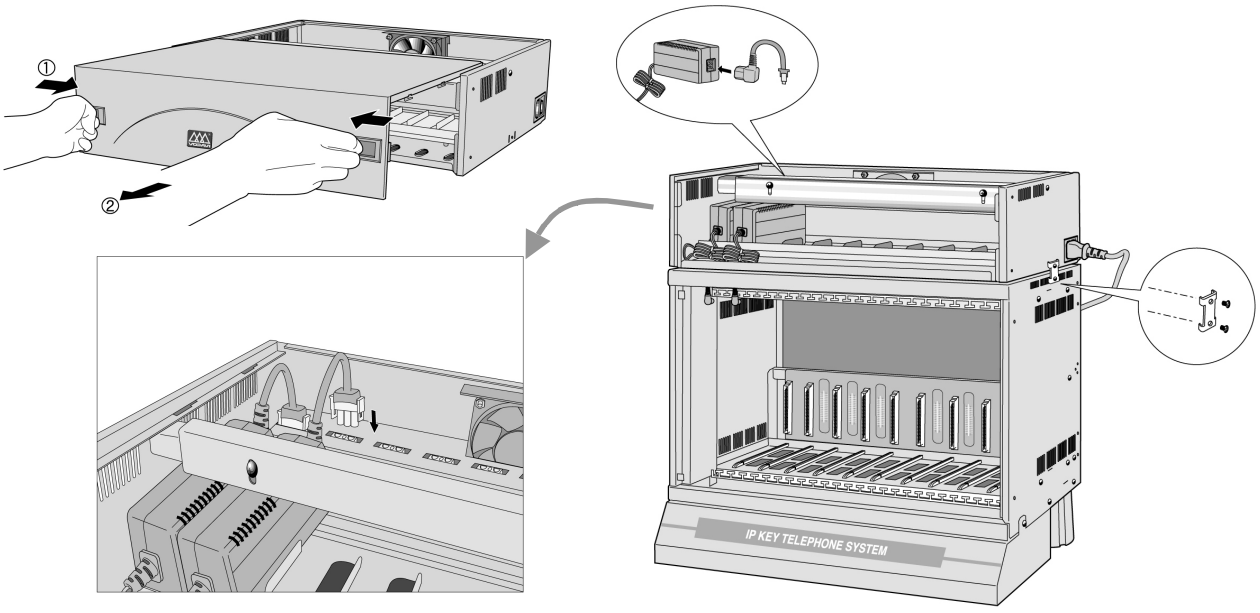


Figure 3-4: Power Box Installation

Main Cabinet and Power Box Grounding

Before connection to AC power, the Cabinet must be connected to an Earth Ground in conformance with the appropriate IEEE recommendations. An Earth Ground is required for user safety and to minimize EMC interference.

To ensure proper system operation and for safety purposes, a good earth ground is required. A metallic COLD water pipe usually provides a reliable ground. Carefully check that the pipe does not contain insulated joints that could isolate the ground path. If insulated joints exist, another earth ground source must be used or, if allowed, the joints may be bridged.

An 18 AWG UL type 1015 or larger copper wire is recommended as the ground wire. However, check the appropriate national or local codes for proper conductor type and size. The wire should be kept as short as possible, it is recommended that the wire be no longer than 1 meter (about 3.3 feet).

When the Power Box is installed with the Main Cabinet, the Ground wire should be connected to the **GND** terminal located on the rear side of Power Box. Loosen the GND terminal sufficiently to insert the Ground wire and re-tighten the terminal securely. Also assure the Main Cabinet and Power Box fasteners are securely tightened.

When the Main Cabinet is installed without the Power Box, the Ground wire should be connected to the **GND** terminal located on rear bottom left side of the Cabinet. Loosen the terminal sufficiently to insert the Ground wire and re-tighten securely.

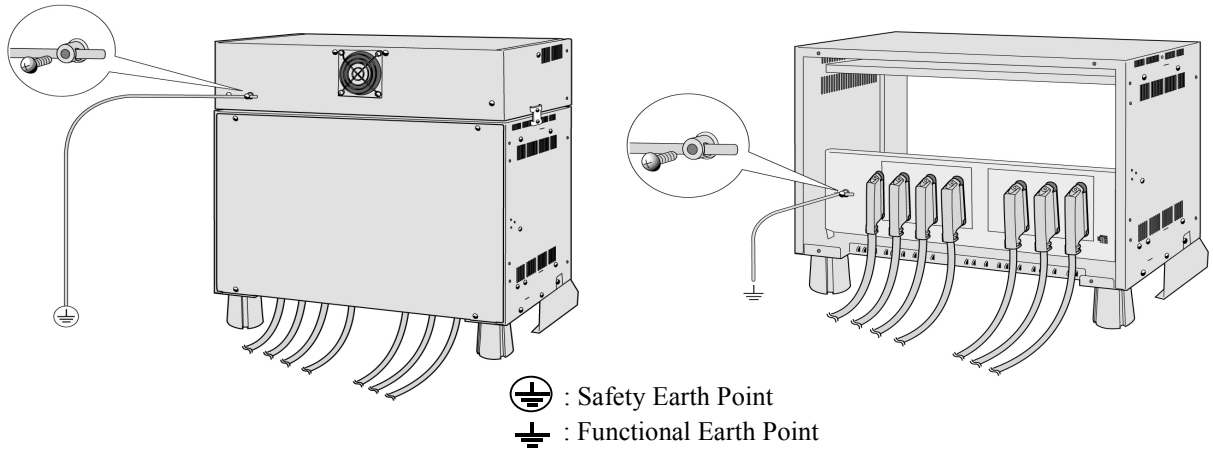


Figure 3-5: MCAB and Power Box Grounding

Module Desk Mount Holder Kit

To assemble the Desk Mount Holder, refer to the instructions below. Note a Desk Holder Extender is required for each Module.

1. Place the key-hole slot on the side of the Extender over the key on the side of the bookend.
2. Slide the Extender and bookend to the locked position.
3. Repeat for additional Extenders and the other bookend.

Once assembled, Modules are simply placed in the Desk Holder "slots". The front of all Modules should be placed on the same side of the Desk Holder.

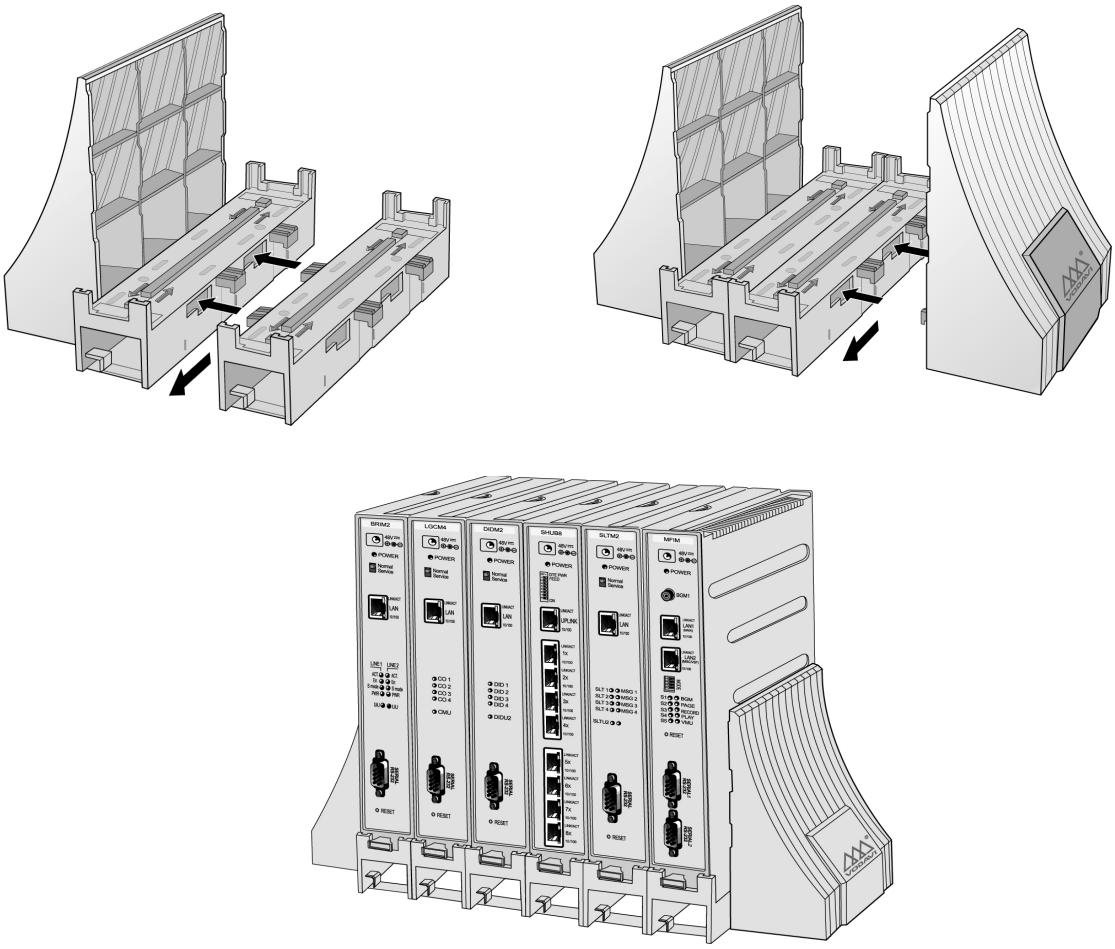


Figure 3-6: Module Desk Mount Holder Kit

Module Wall Mount Holder Kit

The Module Wall Mount Holder will house a single Module.

To install:

1. Place the Wall Mount Holder in position and mark two holes over a wall stud. If a wall stud is not found, a wall fastener such as a toggle bolt must be used.
2. Drill pilot holes for the 7 mm x 38 mm (#10 x 1½ inch) or larger screws, if a stud location cannot be found, wall fasteners such as toggle bolts should be used.
3. Insert the two screws into the pilot holes, leaving about 6 mm (¼ inch) exposed.
4. Place (hang) the Wall Mount Holder on the screws and tighten securely.
5. Slide the Module into the Wall Mount Holder until it locks.
6. Connect all wiring to the Module as appropriate.

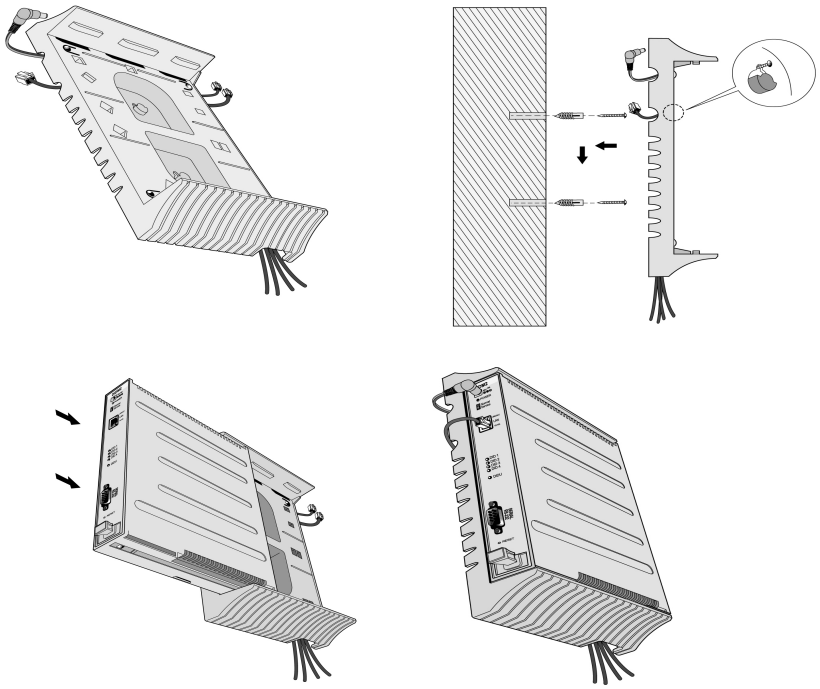


Figure 3-7: Module Wall Mount Holder Kit

Device Installation Guidelines

Station numbers are assigned consecutively based on the order of connection to the system. Since the first IP Keyset is assigned as the Attendant (station number 100), it is recommended that the IP Keyset for station 100 be connected to the system prior to installing any SLT gateway Module.

The system does not differentiate between the types of PSTN Modules during initialization. Thus, an MFIM is always assigned **SEQUENCE NUMBER** 01 with CO Line ports 1-6 for the VoIP function. A LGCM4 that is the first Module connected to the MFIM (under power) is assigned **SEQUENCE NUMBERS** 02 and 03 with corresponding CO Line ports 7-8 and 9-10, a DIDM2 with DIDU2 that is the second Module connected is assigned **SEQUENCE NUMBERS** 04 and 05 with CO Line ports 11-12 and 13-14, and another LGCM4 connected third is assigned **SEQUENCE NUMBERS** 06 and 07 with CO Line ports 15-16 and 17-18.

Although the Module sequence order can be changed in administrative programming, connecting the gateway Modules to the *Telenium*^{IP} Zone in the desired sequence based on type of Module is recommended. The Module **SEQUENCE NUMBER** is easily established at installation by controlling the connection order of the Module's LAN port to the system (hub connected to the MFIM's LAN 1 and LAN 2 ports) and resetting the system through the MFIM.

Module Installation

The following paragraphs provide general and common installation and wiring practices and procedures for all Modules. Procedures such as LAN wiring are common for all Module LAN ports and are discussed here. Prior to installation of any Module, it is recommended that the installer be thoroughly familiar with the information in this section.

Modules must be installed in a Wall Mount Holder, Desk Holder, or the Main Cabinet for proper ventilation. Do not stack Modules or limit airflow, as this may cause overheating which can lead to premature failure of the equipment.

Module Installation Sequence

As the system initializes, a **SEQUENCE NUMBER** is assigned to all gateway Modules based on the order of registration with the system through the MFIM. Refer to the *Telenium*^{IP} *System Programming Manual* for further details. This **SEQUENCE NUMBER** determines the logical CO Line and SLT station numbers assigned in the system database.

When the *Telenium*^{IP} Modules are connected to the MFIM in a *Telenium*^{IP} Cabinet, a logical port number is associated with the Sequence Number. The adjacent Table provides the Sequence Number-to-logical-CO Line port relationship.

Do not confuse the logical CO Line port numbers (software) with the physical port numbers (hardware). Physical ports from the modules connect to devices. Refer to *Figure 3-21: MB Wiring Diagram for Champ Connectors on page 3-30*

SEQUENCE NUMBER	CO LINE PORT
1	1-6
2	7-8
3	9-10
4	11-12
5	13-14
::	::
18	40-41
19	41-42

Module Insertion/Removal

Modules are easily inserted into the Main Cabinet; place the Module with front panel forward in the desired slot in the cabinet and slide the Module into the Cabinet, engaging the connectors of the backplane and Module. Note slot 10 is used only for the MFIM.

To remove a Module from the Main Cabinet, pull on the Release while sliding the Module out of the cabinet.

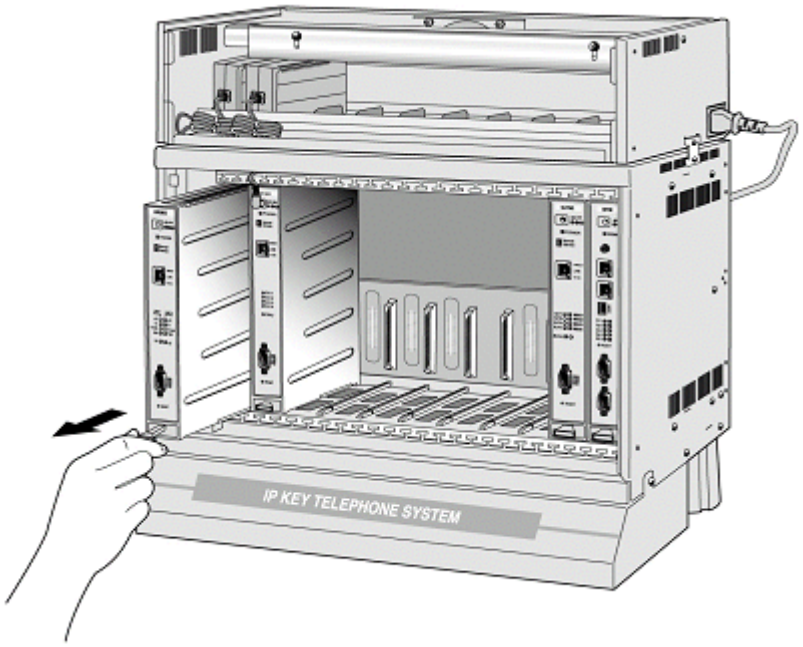


Figure 3-8: Cabinet Insertion/Removal

Common Module Switches

With the exception of the SHUB8, all Modules have a recessed Reset and a Normal/ Service switch. These switches are employed for maintenance purposes. The Reset switch will restart the Module firmware, resetting only scratch-pad memory. The Normal/Service switch activates a graceful shutdown of the Module. As busy circuits go idle they are marked as Out-of-Service.

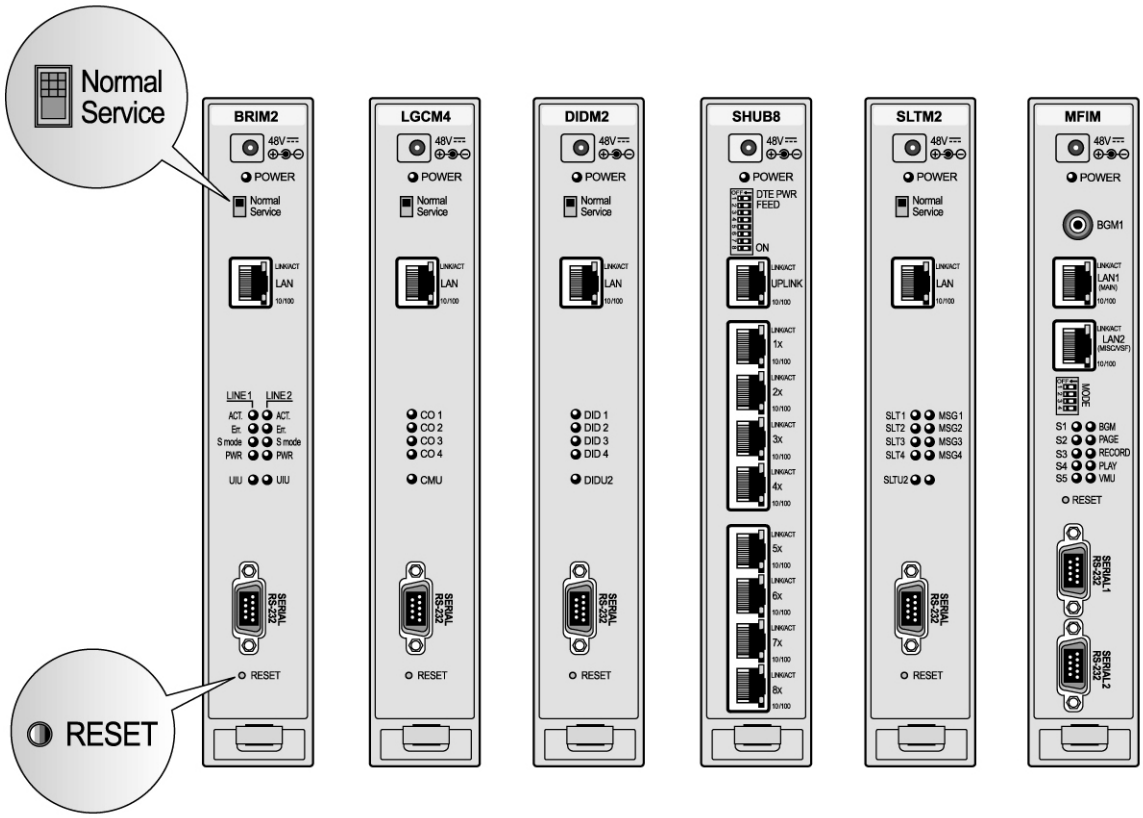


Figure 3-9: Common Module Switches

Module Grounding

A "**GND**" screw is located on the rear panel of each Module. For proper operation and code compliance, the grounding screw **MUST** be connected to a known earth ground using a #18 AWG or larger UL-1015 type copper wire. Note that when using the Main Cabinet, a separate ground connection to the individual Modules is not required.

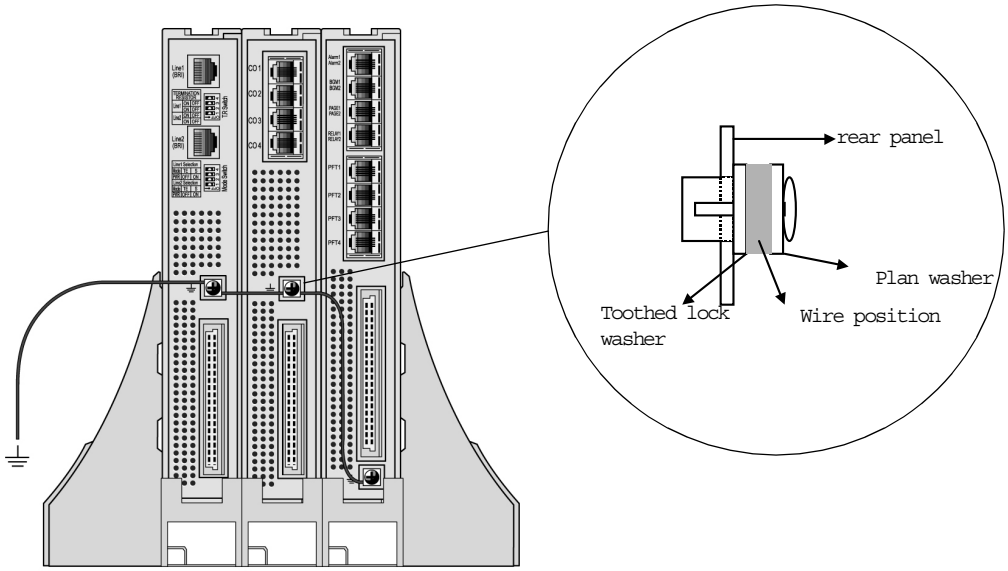


Figure 3-10: Module Grounding

Telephony Connections

In general, PSTN and SLT (telephony) connections are available on the rear of each Module. LAN, power, and RS-232 connections are on the front of each Module.

Telephony connections are via RJ-11 type jacks wired as in *Figure 3-11*. These telephony jacks are also employed for the miscellaneous functions of the MFIM Module. Details for the terminations of the miscellaneous function jacks are given in *"MFIM Installation" on page 3-20*.

All telephone wiring should use standard two twisted pair 24 AWG wiring.

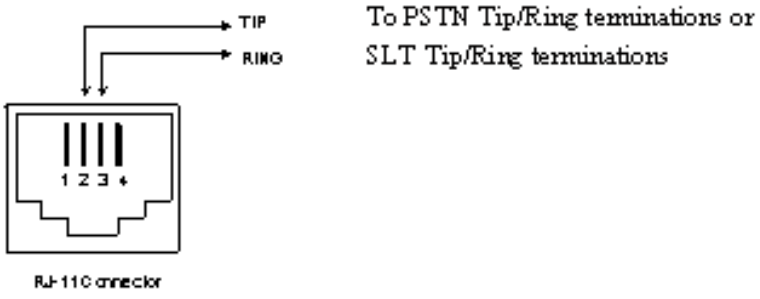


Figure 3-11: Telephony (RJ-11) Connector Pin Assignment

LAN Connections

LAN connections are made by way of RJ-45 connectors on the front panel of each Module. These connectors are shown in *Figure 3-12*. Each connector has a green Link/Activity LED and a yellow LAN speed LED (ON for 100 Base-T).

The gateway Module "LAN" ports and the SHUB8 "UPLINK" ports as well as the IP Keyset LAN are terminated in the standard Media Dependent Interface (MDI) configuration shown in *Figure 3-12*. The SHUB8 "**X**" LAN ports are terminated in the mating MDIX (crossover) configuration as shown in the figure. The SHUB8 can provide power over the LAN with 48 VDC across pin pairs 4 & 5 and 7 & 8. This mates with the IP Keyset as shown. The IP LCD 2P Keyset is equipped with a second LAN port to connect a PC or similar device to a share LAN infrastructure. This connector is terminated in the MDIX configuration mating to a typical PC with the straight cable.

All LAN wiring must use Category 5 Unshielded Twisted Pair (CAT 5 UTP) cable. No single run of LAN cable should exceed 100 meters (about 328 feet).

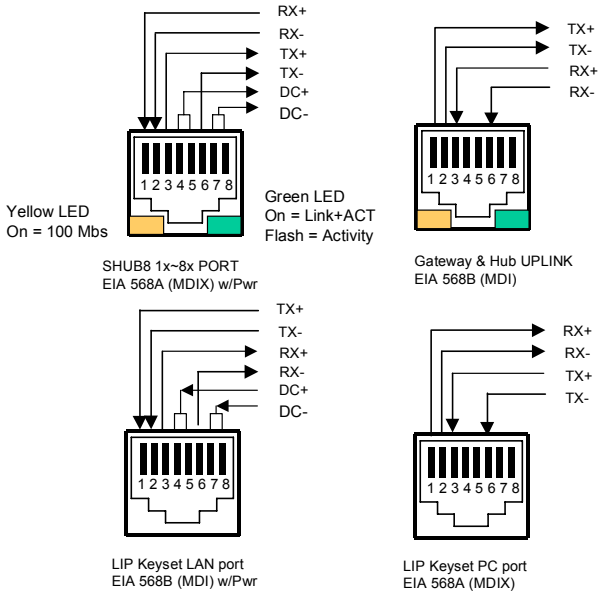


Figure 3-12: LAN Connector (RJ-45) Pin Assignment

LAN Wiring Structures

The LAN wiring architecture used for connecting *Telenium*^{IP} Modules to form a *Telenium*^{IP} Zone is dependent upon several factors including:

- Shared or *Telenium*^{IP}-only LAN infrastructure
- External VoIP calling requirements
- New or existing voice and/or data installation
- Remote LAN power or local AC power for IP Keysets

For a shared environment, the desktop PC is connected to the IP LCD 2P Keyset, which is connected with a standard LAN cable to an RJ-45 LAN jack. The LAN jack is wired to a hub, which is connected to the MFIM and other IP KTS Modules and IP Keysets. This last connection can be through a connection to the same hub or by an indirect connection through multiple hubs.

For a new installation, or where LAN power to the IP Keyset is required, the SHUB8 can be employed for the corporate LAN. For existing installations, it will be necessary to replace existing hubs in a shared environment in order to provide remote power to the IP Keysets.

In the shared environment, both data and voice will have access to the WAN, which also permits external VoIP calling. In the non-shared LAN environment, the system must be connected to the WAN to support external VoIP connections.

Due to the advantages of the shared environment, support for remote LAN power, and external VoIP calling, the SHUB8, which is a standard switching hub, should be employed. The recommended structure, called a "hierarchal" wiring, employs all "straight" LAN cables (MDI to MDIX) and is shown in *Figure 3-13*. Additional SHUB8 Modules are connected using the UPLINK port to the switched ports of the primary SHUB8. A sufficient number of SHUB8 modules are connected to provide the total number of ports required. Each Module, IP Keyset, and IP DSS requires a single port and the MFIM will require two ports.

Thus, an 8 CO Line, 24 station system would require a total of 28 ports (MFIM = 2 ethernet ports, two LGCM4 = 2 ethernet ports and 24 IP Keysets = 24 ethernet ports), and would be structured as in the following table and figure.

Quantity	Device	CO Lines	Ethernet Ports	System Ports
2	LGCM4	8	2	8
1	MFIM	6	2	6
24	IP 24D	0	24	24
		14	28 (4 SHUB8s required)	38 total ports of 96 available

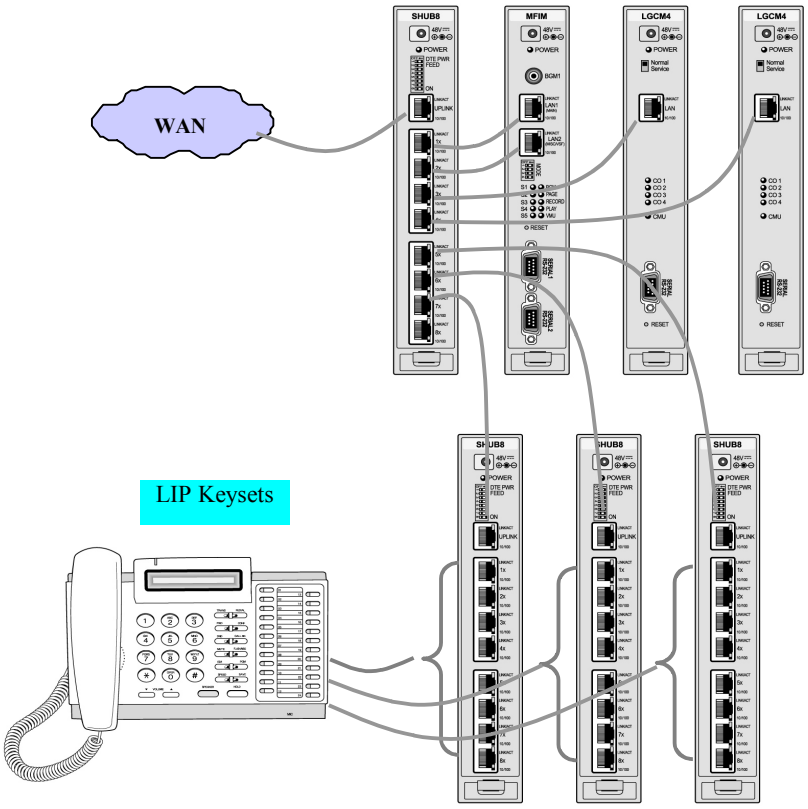


Figure 3-13: *Telenium*^{IP} LAN Wiring Example

Cascading

When the station loop limit is beyond the 100 meter (330 feet) limit, hubs may be cascaded to extend the range. For the SHUB8, simply connect the extension hubs with their UPLINK port to a LAN 1X-8X port of the previous SHUB8 in the cascade.

The SHUB8 does not support spanning tree. Do not create a loop when connecting these hubs to each other or other network components.

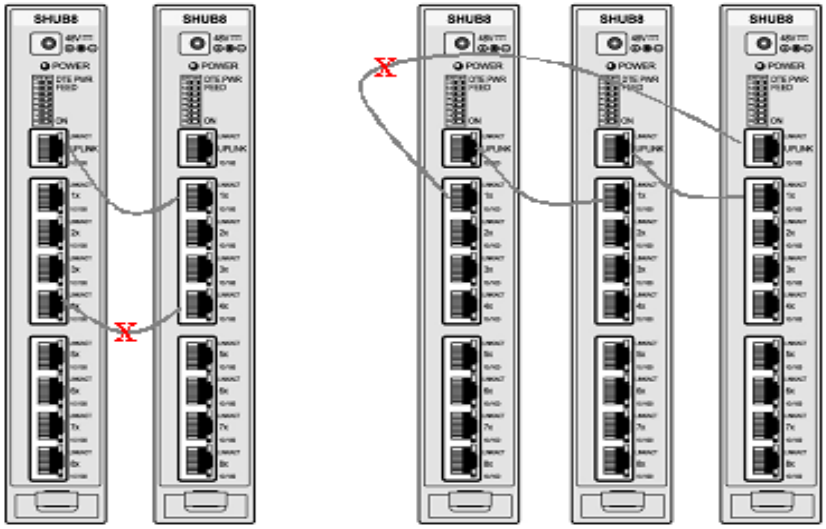


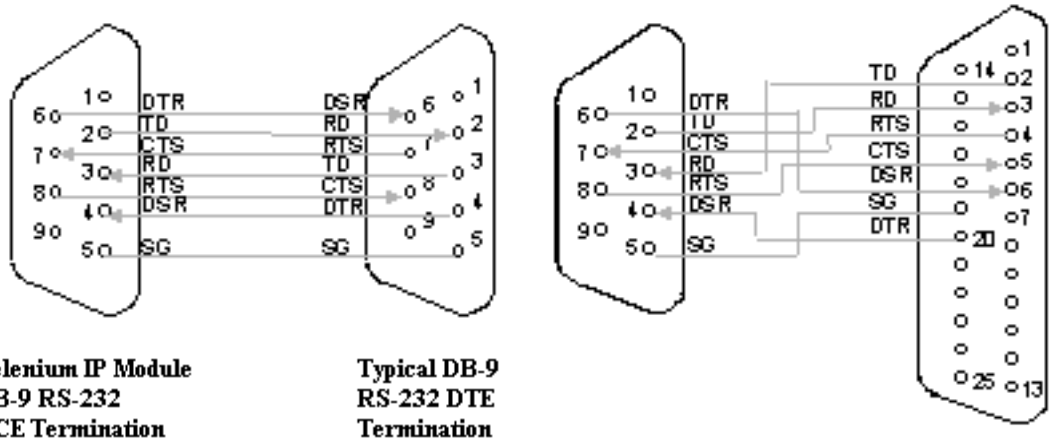
Figure 3-14: Erroneous Loop Wiring

RS-232 Connections

The DB-9 connectors located on the front panel of gateway Modules are RS-232 serial ports. These connectors are employed to provide system trace and diagnostic routines for the individual Modules. The MFIM has two such ports, which may be assigned for the desired function (SMDR, ACD, etc.). Refer to the *Telenium^{IP} System Programming Manual*.

As a default, the serial ports of MFIM are set-up for 8 bits, no parity, and one stop bit running at 38,400 bps. All other Modules are set-up for 7bits, no parity, and two stop bits running at 38,400 bps. To modify these settings, refer to the *Telenium^{IP} System Programming Manual*.

The RS-232 connectors are terminated as displayed in *Figure 3-15*. Use a cable pre-terminated with DB-9 connectors to connect an appropriate device (terminal, printer, etc.) to the Module.



Designation	Function
TD	Transmitted Data
RD	Received Data
RTS	Request To Send
CTS	Clear To Send
DTR	Data Terminal Ready
DSR	Data Set Ready

Figure 3-15: RS-232 DB-9 Pin-Outs

Module Power Adapter

Each Module is shipped with an AC/DC Adapter, which converts local AC to 48 VDC for Module power. One side of the adapter has a three-prong parallel blade male termination and mates with the supplied power cord. The supplied AC power cord is plugged into the adapter and into the local AC power source.

The other end of the adapter is terminated in a DC power cord with a plug at the end. This DC power plug is inserted into the power input jack on the upper front panel area of each Module. The Power LED on the Module front panel will illuminate when power is applied.

MFIM Installation

The MFIM Module must be installed only in slot ten of the Main Cabinet. This slot is dedicated to the MFIM. When Desk mounting Modules, the MFIM may be inserted anywhere in the Desk Mount Holder.

LEDs

In addition to the Power and LAN LEDs, the MFIM has ten LEDs for status and diagnostic information as described in the following table.

LED DESIGNATION	LED STATUS FUNCTION - ON
S1	Serial/TCP debug active
S2	Call Processing active
S3	Active data communication with Modules and IP keysets
S4	LCD control active
S5	Clock alive (flashing)
BGM	BGM or internal MOH is active
PAGE	Ext. Page 1 or Ext. Page 2 is active
RECORD	VSF Record active
PLAY	VSF Play-back active
VMU	Voice Storage Memory Unit installed

MODE Switch & Settings

The MFIM has a four-position dip switch identified as the "**MODE**" switch. The function of each switch position is given in the following table.

Switch	Function	OFF	ON
1	Database write protect	Unprotect	Protect
2	Service Switch	Service	Normal
3	Registration Authorization	Disallow	Allow
4	Initialization	Initialize on reset	Read stored DB on reset

To enter data in the system's database, the Write Protect switch must be in the OFF position. In the ON position, the database cannot be modified. Thus, placing the switch in the ON position eliminates the potential for remote database modification. If remote data entry is not desired, after all installation and database entries are complete, place the switch in the ON position.

The system database is initialized based on switch position 4. In the ON position the system will load default values in the system database and conduct a general Module registration when power is applied to the MFIM. Note that if the system loses power for any reason with the switch in the ON position, the database will be initialized. Place the switch in the OFF position to maintain the database in the case of power loss or reset. For a description of the initialization process refer to the *Telenium^{IP} System Programming Manual*.

Wiring Connectors

Before wiring any of the Modules, first connect the "**GND**" screw on the back of the Module to a known earth ground. Refer to *"Module Grounding" on page 3-14*.

On the front of the MFIM are the "LAN 1" and "LAN 2" RJ-45 connectors. These connectors should be wired to the appropriate LAN points as discussed in *"LAN Connections" on page 3-15* and *"LAN Wiring Structures" on page 3-16*.

- Wire "LAN 1" to a 10/100 Base-T switch. A SHUB8 can be used to form the *Telenium*^{IP} Zone.
- Wire "LAN 2" to a 10/100 Base-T switch. A SHUB8 can be used to form the *Telenium*^{IP} Zone.
- Tag or number wiring for maintenance.

CAUTION: *Before connecting the LAN from SHUB8, the appropriate switch for DTE power must be in the "OFF" position.*

On the rear are eight RJ-11 connectors terminated for miscellaneous functions, which should be wired as in *Figure 3-16*. When using a Main Cabinet, refer to *"Main Cabinet Wiring" on page 3-29* for wiring instructions.

- Wire Miscellaneous function connectors as depicted in the sketches of *Figure 3-16* below.
- Tag or number wiring for maintenance.

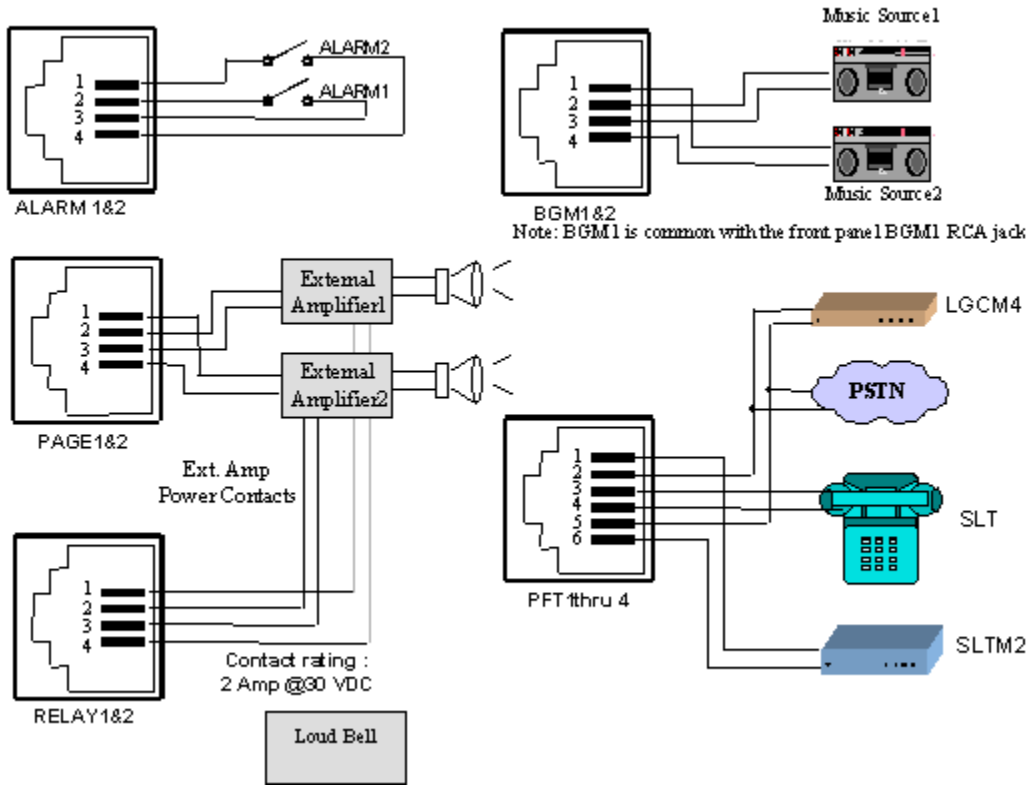


Figure 3-16: MFIM Miscellaneous Function Connections

AC/DC Adapter

Assure the AC/DC Adapter is plugged into a live AC outlet and the Module Power jack.

LGCM4 Installation

The LGCM4 may be installed in any slot of the Main Cabinet, except for slot ten, or may be installed anywhere in the Desk Mount Holder. The LGCM4 provides a gateway between standard PSTN Loop/Ground Start Lines and the *Telenium*^{IP} KTS. The LGCM4 can support four PSTN Lines.

LEDs

In addition to the Power and LAN LEDs, the LGCM4 has four status LEDs. These LEDs indicate that the individual PSTN Lines are busy (LED on), idle (LED off) or ringing (LED flashing).

Wiring Connectors

Before wiring any of the Modules, connect the "**GND**" screw on the back of the Module to a known earth ground. Refer to *"Module Grounding" on page 3-14*.

On the front of the LGCM4 is the RJ-45 type "LAN" connector. This connector should be wired to the appropriate LAN points.

- Wire "LAN" to a 10/100 Base-T switch. A SHUB8 can be used to form the *Telenium*^{IP} Zone.
- Tag or number wiring for maintenance.

CAUTION: *Before connecting the LAN from SHUB8, the appropriate switch for DTE power must be in the "OFF" position.*

On the rear are four RJ-11 connectors terminated which should be wired to the telephone company termination point. When using a Main Cabinet, refer to *"Main Cabinet Wiring" on page 3-29* for wiring instructions.

- Wire each RJ-11 to a CO Line at the PSTN termination point/MDF.
- Tag or number wiring for maintenance.

AC/DC Adapter

Assure the AC/DC Adapter is plugged into a live AC outlet and the Module Power jack.

DIDM2 Installation

The DIDM2 may be installed in any slot of the Main Cabinet, except for slot ten, or may be installed anywhere in the Desk Mount Holder. The DIDM2 provides a gateway between standard telephone company DID Lines and the *Telenium*^{IP} KTS.

The basic DIDM2 can support two DID Lines and can be expanded with the DIDU2 by an additional two Lines for a total of four DID Lines. If required, install the optional DIDU2 expansion unit before installing or wiring the DIDM2.

LEDs

In addition to the Power and LAN LEDs, the DIDM2 has four status LEDs for each DID Line. These LEDs indicate that the DID Line is in-use (LED on), signaling (LED flashing), or idle (LED off). Note that the LEDs for circuits 3 and 4 will only function if the DIDU2 is installed.

Wiring Connectors

Before wiring any of the Modules, connect the "**GND**" screw on the back of the Module to a known earth ground, refer to *"Module Grounding" on page 3-14*.

On the front of the DIDM2 is the RJ 45 type "LAN" connector. This connector should be wired to the appropriate LAN points as discussed in *"LAN Connections" on page 3-15* and *"LAN Wiring Structures" on page 3-16*.

- Wire "LAN" to a 10/100 Base-T switch. A SHUB8 can be used to form the *Telenium*^{IP} Zone.
- Tag or number wiring for maintenance.

CAUTION: *Before connecting the LAN from SHUB8, the appropriate switch for DTE power must be in the "OFF" position.*

On the rear are two or four RJ-11 connectors terminated as described in *"Telephony Connections" on page 3-14*, which should be wired to the telephone company termination point. When using a Main Cabinet, refer to *"Main Cabinet Wiring" on page 3-29* for wiring instructions.

- Wire each RJ-11 to a DID Line at the PSTN termination point/MDF.
- Tag or number wiring for maintenance.

AC/DC Adapter

Assure the AC/DC Adapter is plugged into a live AC outlet and the Module Power jack.

DIDU2 Installation

The basic DIDM2 is equipped with circuitry to support two DID Lines and can be expanded with the DIDU2 to support four DID Lines. The DIDU2 is installed in the DIDM2 as described below and shown in *Figure 3-17*.

- Remove the Option Cover plate on the rear of the Module by pulling away from the Module.
- Insert the DIDU2 option board and slide into the Module engaging the Module connector fully.
- To remove the DIDU2, press up on the release latch and pull the DIDU2 out of the module as shown in *Figure 3-17*.

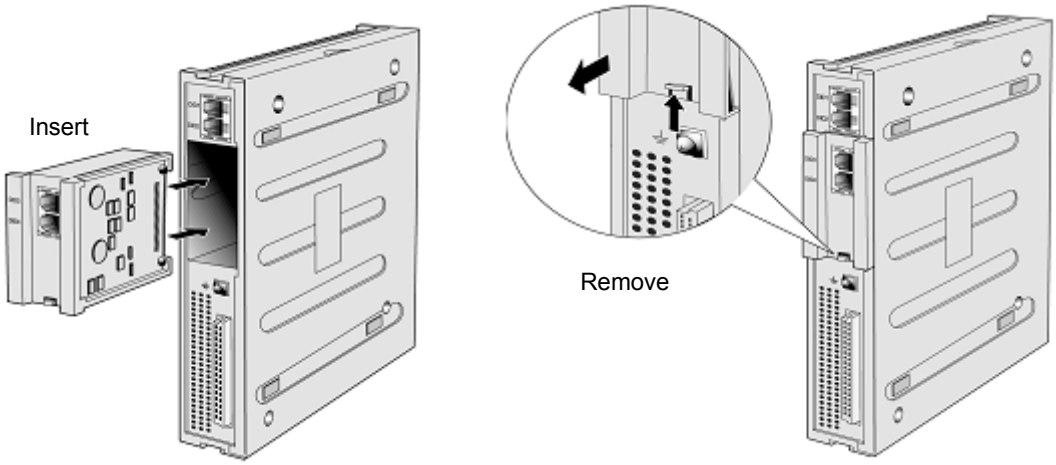


Figure 3-17: DIDU2 Installation

SLTM2 Installation

The SLTM2 may be installed in any slot of the Main Cabinet, except for slot ten, or may be installed anywhere in the Desk Mount Holder. The SLTM2 provides a gateway between standard Single Line Telephone devices and the *Telenium*^{IP} system.

The basic SLTM2 can support two SLT devices and can be expanded with the SLTU2 by an additional two SLT devices for a total of four devices. If required, install the optional SLTU2 port expansion unit before installing or wiring the SLTM2, refer to *"SLTU2 Installation" on page 3-25*.

LEDs

In addition to the Power and LAN LEDs, the SLTM2 has eight status LEDs, two for each respective SLT port 1-4. The left bank of four LEDs indicates the status of the associated SLT port: in-use (LED on), ringing (LED flashing), or idle (LED off). The right bank of four LEDs indicates Message Wait status for the associated SLT port; message active, LED on.

The LEDs for circuits 3 and 4 function only when the SLTU2 is installed.

Wiring Connectors

Before wiring any of the Modules, first connect the "**GND**" screw on the back of the Module to a known earth ground, refer to *"Module Grounding" on page 3-14*.

On the front of the SLTM2 is the RJ 45 type "LAN" connector. This connector should be wired to the appropriate LAN points as discussed in *"LAN Connections" on page 3-15* and *"LAN Wiring Structures" on page 3-16*.

- Wire "LAN" to a 10/100 Base-T switch. A SHUB8 can be used to form the *Telenium*^{IP} Zone.
- Tag or number wiring for maintenance.

CAUTION: *Before connecting the LAN from SHUB8, the appropriate switch for DTE power must be in the "OFF" position.*

On the rear are four RJ-11 connectors which should be wired to the SLT termination point. When using a Main Cabinet, refer to *"Main Cabinet Wiring" on page 3-29* for wiring instructions.

- Wire each RJ-11 to an SLT device/MDF.
- Tag or number wiring for maintenance.

AC/DC Adapter

Assure the AC/DC Adapter is plugged into a live AC outlet and the Module Power jack.

SLTU2 Installation

The basic SLTU2 is equipped with circuitry to support two SLT devices and can be expanded with the SLTU2 to support four SLT devices. The SLTU2 is installed in the SLTU2 as described below and shown in *Figure 3-18*.

- Remove the Option Cover plate on the rear of the Module by pulling away from the Module.
- Insert the SLTU2 option board and slide into the Module engaging the Module connector fully.

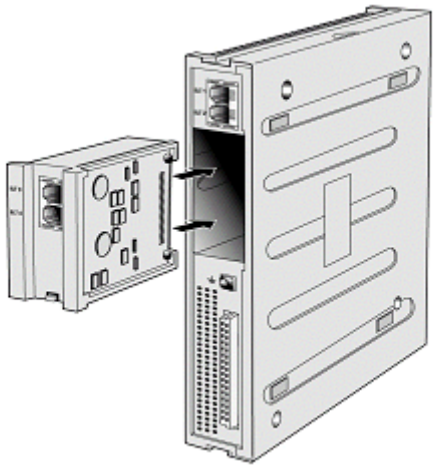


Figure 3-18: SLTU2 Installation

BRIM2 Installation

The BRIM2 may be installed in any slot of the Main Cabinet, except for slot ten, or may be installed in any slot in the Desk Mount Holder. The BRIM2 provides a gateway between ISDN Basic Rate Interface (BRI) lines and the *Telenium*^{IP} System.

The BRIM2 can support two BRI lines with either an "S" or "T" interface.

LEDs

In addition to the Power and LAN LEDs, there are ten LEDs, five for each BRI circuit, which provide the status information as described in the following table.

LED Designation	ON	OFF	Remark
ACT	Line Active	Idle	
ERR	Line Error	Normal	
S Mode	S Mode	T Mode	S/T interface only
PWR	Power feed on	Power feed off	S/T interface, S mode only
UIU	UIU installed	UIU not installed	

BRI Switches

On the rear panel of the BRIM2 is two 4-position dip switches; the TR (Terminating Resistor) switch permits terminating the Transmit and Receive pairs with a 100 ohm termination. The MODE switch selects the interface mode (S/T) and power feed. Note, the TR switch pertains only to the S and T interfaces and is not used with "U" interfaces. The Mode switch is only used for an S interface to enable power feed. The functions of the four switch positions are given in the following table and should be set based on the user and ISDN Line requirements.

Switch	Function	ON	OFF
4 3	BRI Line 1 Terminations	Terminations on	Terminations off
2 1	BRI Line 2 Terminations	Terminations on	Terminations off

Switch	Function	ON	OFF
4	BRI Line 1 ST Mode	T Mode	S Mode
3	Power Feed for Line 1	No Feeding	Feeding
2	BRI Line 2 ST Mode	T Mode	S Mode
1	Power Feed for Line 2	No Feeding	Feeding

Wiring Connectors

Before wiring any of the Modules, first connect the "**GND**" screw on the back of the Module to a known earth ground, refer to *"Module Grounding" on page 3-14*.

On the front of the BRIM2 is the "LAN" connector, RJ-45 type. This connector should be wired to the appropriate LAN point as discussed in *"LAN Connections" on page 3-15* and *"LAN Wiring Structures" on page 3-16*.

- Wire "LAN" to a 10/100 Base-T switch. A SHUB8 can be used to form the *Telenium*^{IP} Zone.
- Tag or number wiring for maintenance.

CAUTION: *Before connecting the LAN from SHUB8, the appropriate switch for DTE power must be in the "OFF" position.*

On the rear are two RJ-45 connectors terminated to the BRI Line interface circuits. When using a Main Cabinet (MCAB), refer to *"Main Cabinet Wiring" on page 3-29* for wiring instructions. These connectors, refer to *Figure 3-19*, should be wired to the telephone company termination point.

The connector pin assignments for the RJ-45 type jack on BRIM2 are as shown:

- Wire each RJ-45 to a BRI line at the ISDN termination point/MDF.
- Tag or number wiring for maintenance.

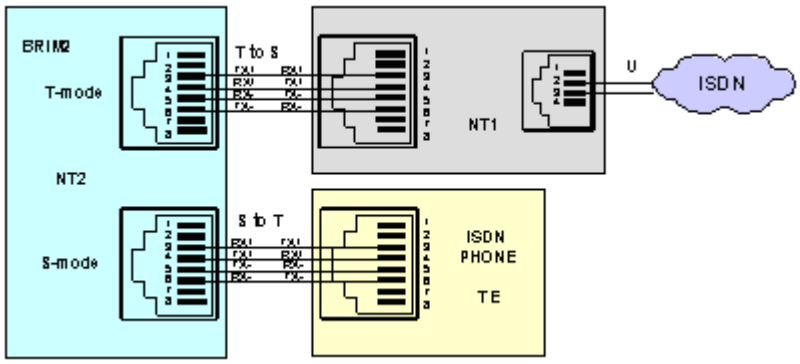


Figure 3-19: BRIM2 BRI Line Connector Configuration

AC/DC Adapter

Assure the AC/DC Adapter is plugged into a live AC outlet and the Module Power jack.

SHUB8 Installation

The SHUB8 may be installed in any slot of the Main Cabinet, except for slot ten, or may be installed anywhere in the Desk Mount Holder. The SHUB8 is employed to connect IP Keysets, standard VoIP phones and other IP Modules to the *Telenium*^{IP} Zone. The SHUB8 has eight switched 10/100 Base-T Ethernet ports and an "UPLINK" port for a total of nine switched ports. The eight switched ports can provide DC power of 48 Volts over the LAN to remotely power the IP Keysets and DSS consoles based on the dip switch settings.

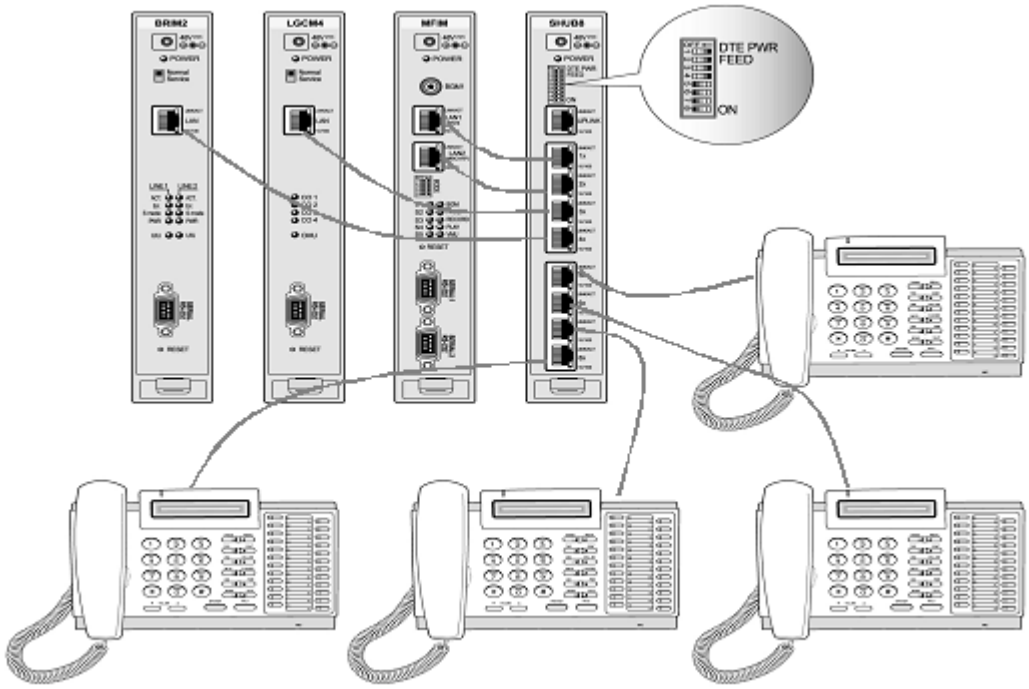


Figure 3-20: SHUB8 Switch Close-up

LEDs

The SHUB8 has a Power LED and LAN connector LEDs. Each LAN connector has a green LED indicating Link and activity and a yellow LED indicating Link speed (ON for 100Mbs, OFF for 10Mbs).

Remote Power Switch

Each switch port of the SHUB8, except the "UPLINK" port can provide a 48VDC feed over the LAN employing pin pairs 4 & 5 (+) and 7 & 8 (-) of the RJ-45 connector. Power feed is controlled by the eight-position DTE POWER FEED dip switch; in the ON position power is supplied. These switches should be placed in the OFF position until all system wiring is complete. Once complete, the individual ports serving an IP Keyset can be turned ON using the corresponding switch position (1-8), refer to *Figure 3-20*.

***Caution**: The power feed provided by the SHUB8 will cause damage to other LAN devices. Prior to switching any of the dip switch positions ON, assure that only an IP keyset or a DSS console is connected to the SHUB8 switched LAN port.*

Wiring Connectors

Before wiring any of the Modules, first connect the screw on the back of the Module to a known earth ground, refer to *"Module Grounding" on page 3-14*.

On the front of the SHUB8 are the "UPLINK" and eight switched "1X-8X" connectors, each an RJ 45 type. These connectors should be wired to the appropriate LAN points as discussed in *"LAN Connections" on page 3-15* and *"LAN Wiring Structures" on page 3-16*. If cascading is necessary, refer to *"LAN Wiring Structures" on page 3-16*.

- Wire the "UPLINK" port to the corporate LAN router or switch. A SHUB8 can be used to form the *Telenium*^{IP} Zone.
- Wire each "**X**" port to an RJ-45 wall/floor jack at an IP Keyset or VoIP terminal location, or to the "LAN" port of another IP KTS Module.
- Tag or number wiring for maintenance.

AC/DC Adapter

Assure the AC/DC Adapter is plugged into a live AC outlet and the Module Power jack.

Main Cabinet Wiring

When using the Main Cabinet, complete the installation of each Module as in *"Module Installation" on page 3-11* with the exception of the telephony (Miscellaneous, PSTN, ISDN and SLT) connections. With the Main Cabinet, these connections are made through RJ-21X 25-pair connectors mounted on the backplane. The PSTN and ISDN interface circuits are terminated in female RJ-21X connectors. The SLT and Miscellaneous interface circuits are terminated in male RJ-21X connectors. This assures separation of the PSTN MDF terminations from other telephony-like terminations.

Modules terminate the telephony interfaces at the appropriate type of connector through the backplane, using connector pairs (circuit locations) based on the Module location in the Cabinet. Modules such as LGCM4 and DIDM2 are terminated on the PSTN connectors. The SLTM2 Module and the Miscellaneous connections of the MFIM are terminated on the male RJ-21X connectors.

Complete all telephony wiring by making cross-connects between the RJ-21X and the appropriate connection type, referring to the following:

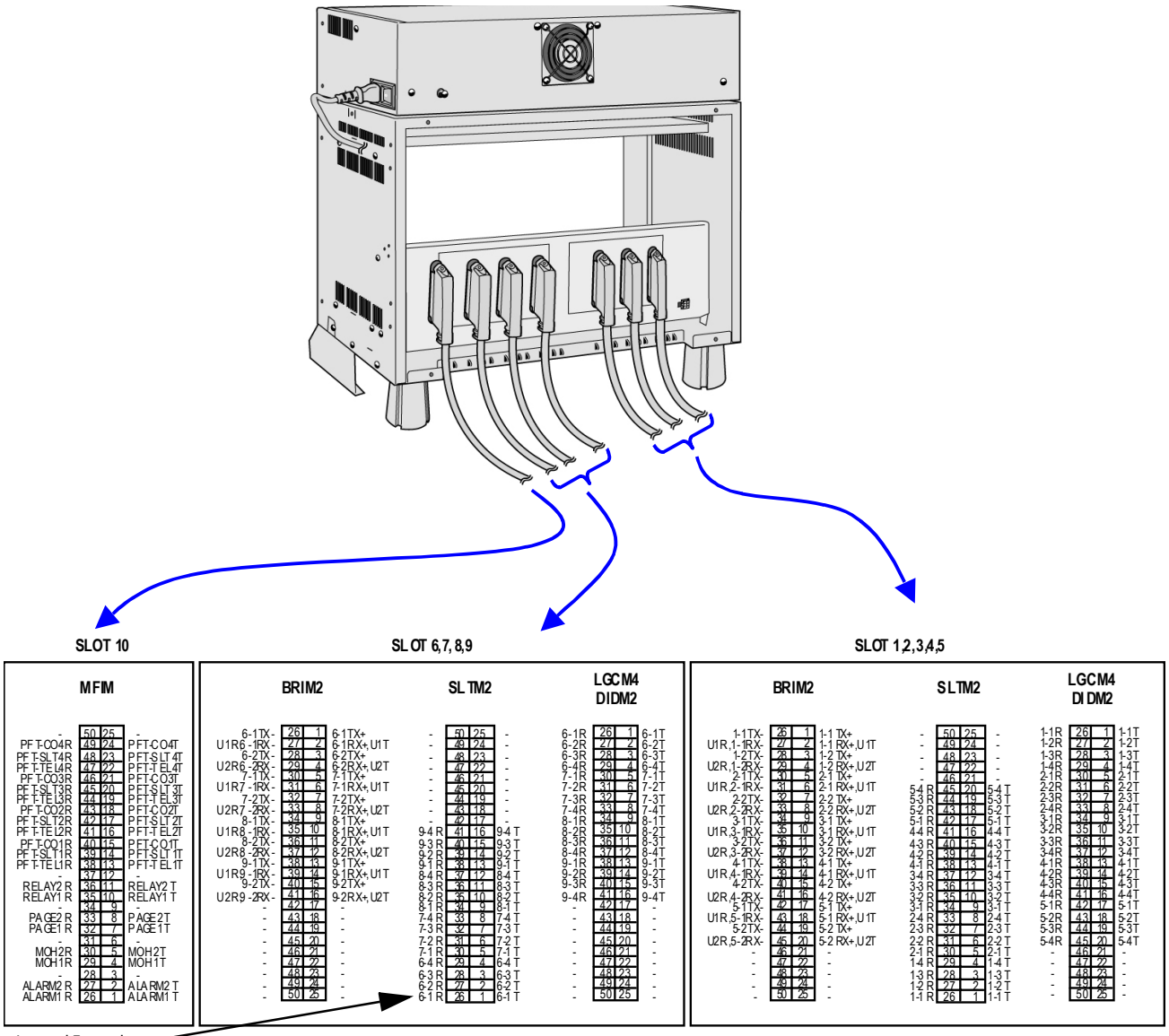
- PSTN and ISDN Connections

  Figure 3-23: Connection for BRIM2 in slots 1 thru 5

  Figure 3-24: Connection for BRIM2 in slots 6 thru 9

  Figure 3-26: Connection for LGCM4 & DIDM2
- SLT Connections - *Figure 3-25: Connection for SLTM2*
- Miscellaneous Connections - *Figure 3-22: Connection for MFIM in slot 10*

Complete all the telephony wiring for the Module prior to applying power to the Module. Note also, to consider the slot and sequence assignments when installing Modules, refer to *"Module Installation Sequence" on page 3-11*.



Legend Example:
6-1 R [26][1] 6-1 T =
6th Slot, Port 1, Ring - pin 26
6th Slot, Port 1, Transmit - pin 1

Note: The slot used and the order of Module connection determines the physical port and resulting pin connections that the system uses for a Module. For example, an LGCM4 is installed in slot 1 and connected to the MFIM. It is assigned to slot 1 and its physical ports 1, 2 , 3, and 4 are associated with pins 26-1, 27-2, 28-3, and 29-4.

A BRIM2 module is then installed in slot 2 and connected. It is assigned to slot 2 and its physical ports 1 and 2 are associated with pins 30-5, 31-6, 32-7, and 33-8.

If a second LGCM4 is installed in slot 3 and connected, it is assigned to slot 3 and its physical ports 1, 2, 3, and 4 are associated with pins 34-9, 35-10, 36-11, and 37-12.

This example is provided only to illustrate connections. An administrator will most likely use like modules in a consecutive sequence for contiguity of numbering assignments.

Figure 3-21: MB Wiring Diagram for Champ Connectors

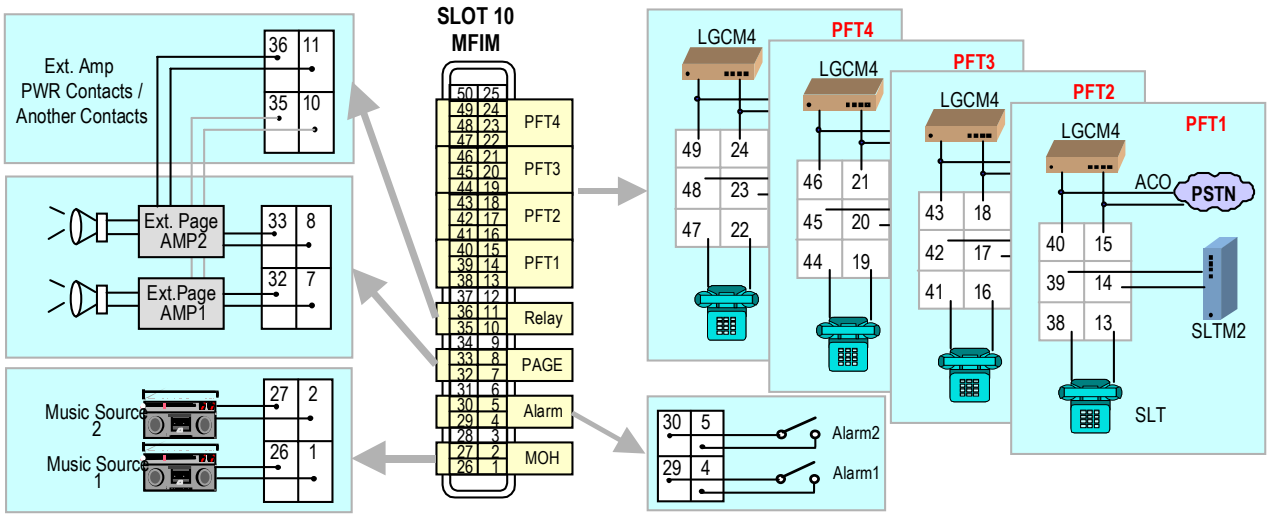


Figure 3-22: Connection for MFIM in slot 10

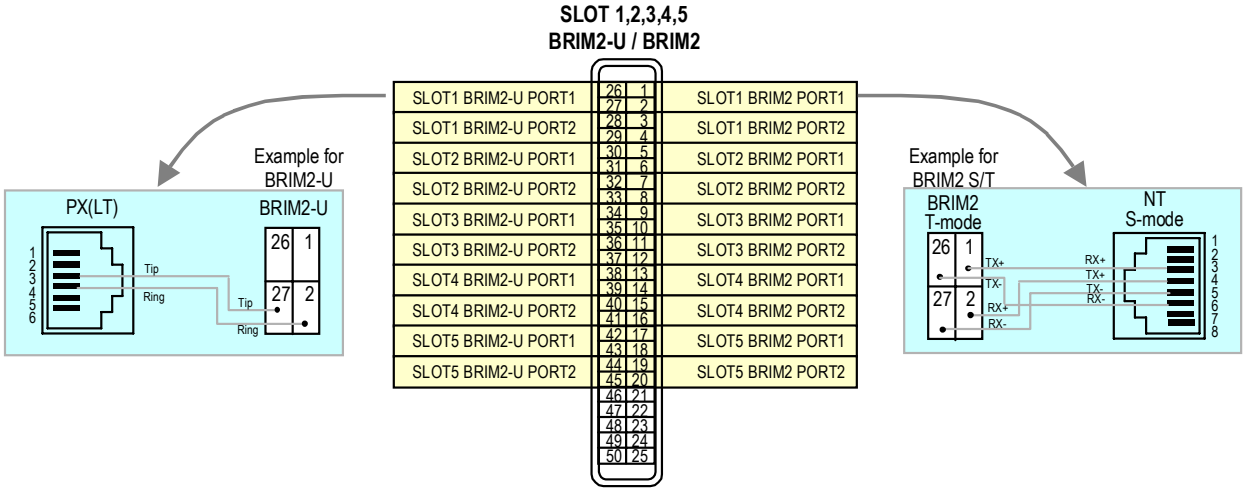


Figure 3-23: Connection for BRIM2 in slots 1 thru 5

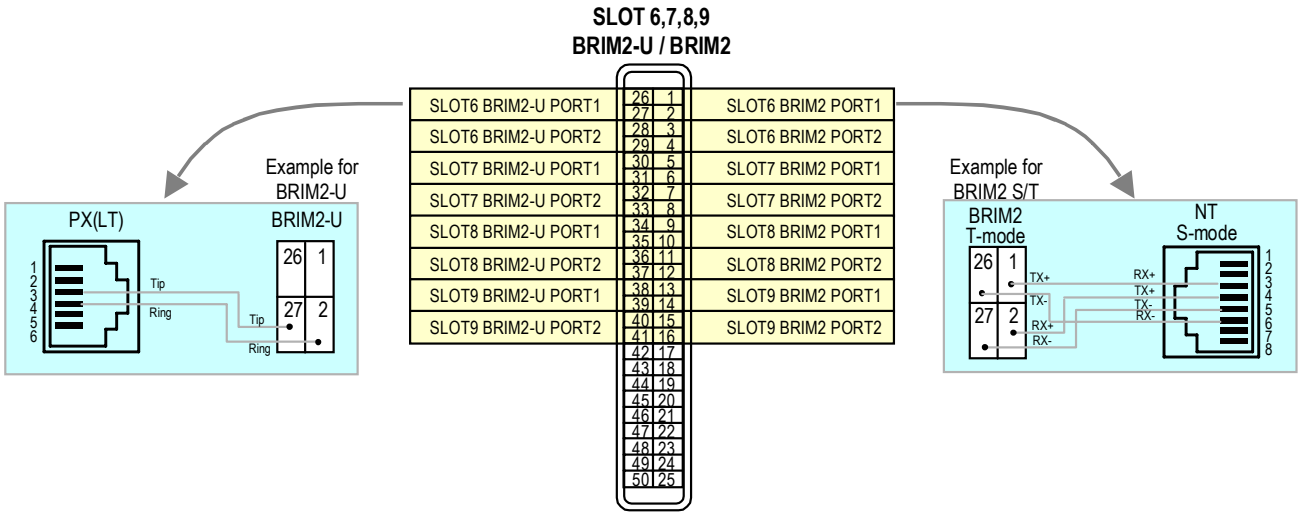


Figure 3-24: Connection for BRIM2 in slots 6 thru 9

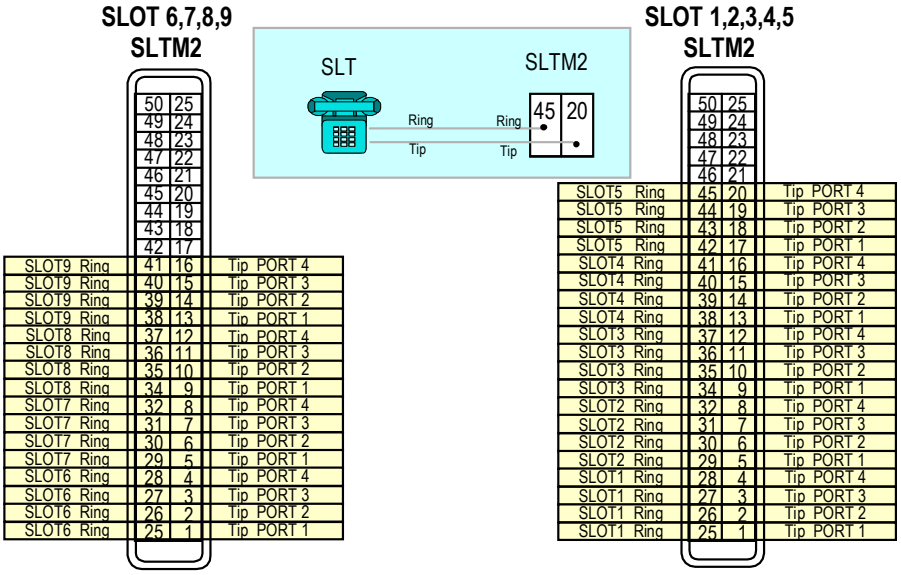


Figure 3-25: Connection for SLTM2

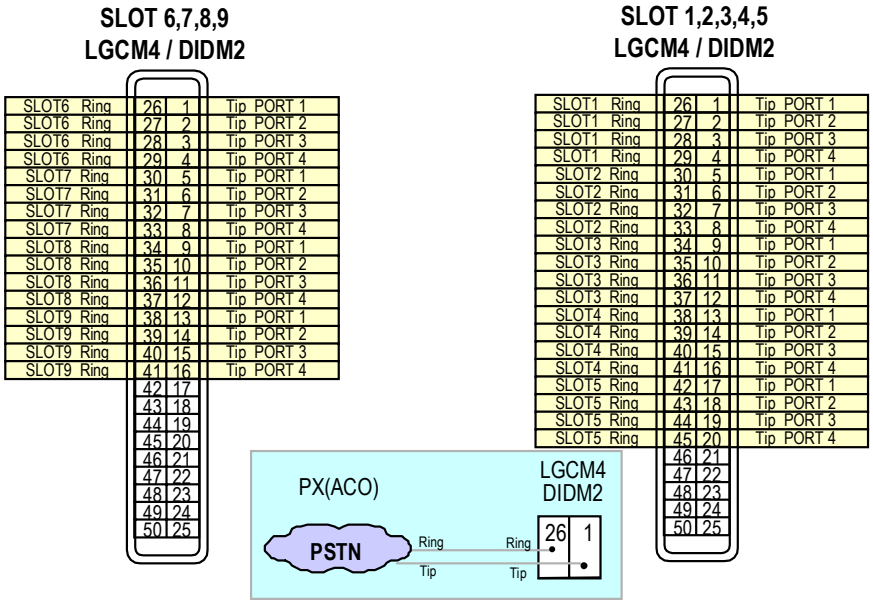


Figure 3-26: Connection for LGCM4 & DIDM2

IP Keyset Installation

The IP Keyset and IP DSS can be connected to any standard 10/100 Base-T Ethernet hub port, such as the IP KTS SHUB8, which is connected to the *Telenium*^{IP} Zone. Each button of the IP Keyset and IP DSS, with the exception of the volume control, has a long-life, super-bright, dual-color LED. The LEDs provide indication of the status for the feature or circuit associated with the button.

Wiring Connectors

The IP Keyset is available in two models, IP-24D and IP-24DH. The IP-24D has a single Ethernet port that is connected to the *Telenium*^{IP} Zone using an RJ-45 plug terminated category 5 cable supplied with the IP Keyset. A three-meter (nine-foot) cable is provided for desk mount installation. Using the cable, one RJ-45 plug is inserted into the IP Keyset "LAN" jack. The other RJ-45 plug is inserted into the RJ-45 jack previously wired to an SHUB8 or other standard hub port in the *Telenium*^{IP} Zone.

The IP-24DH has two 10/100 Base-T Ethernet ports, a "LAN" port and a "PC" port. An intelligent switch, which implements 802.1p protocol for voice packet priority, connects the two ports. This permits the LAN to be shared between the IP Keyset and the desktop PC or other Ethernet terminal without significant affect on the voice or data traffic. The "LAN" port is connected to the *Telenium*^{IP} Zone as described above for the single port IP-24D Keyset. The "PC" port is connected to a desktop device using any standard straight-through category 5 cable.

Power

All IP Keysets and DSS consoles can be powered by the AC/DC Adapter-K- (48 VDC @ 0.1A) at the IP terminal location or over the LAN cable using the SHUB8.

Using the AC/DC Adapter, after connecting the IP terminal to the LAN, the Adapter's DC voltage plug is inserted into the power-input jack on the IP terminal. One end of the AC power cord is inserted into the mating receptacle of the AC Adapter; the other end is inserted into the AC power outlet.

When it is desired to power the IP Keyset or DSS over the LAN, an SHUB8 must be employed. After completion of all wiring, assure that only an IP terminal is connected to the SHUB8 port. Move the appropriate switch position of the **DTE POWER FEED** dip switch of the SHUB8 to the ON position to apply power to the IP terminal.

The power feed provided by the SHUB8 will cause damage to other LAN devices. Prior to switching any of the dip switch positions ON, assure that only an IP keyset or IP DSS console is connected to the SHUB8 LAN port.

Wall Mount

The IP Keysets can be mounted on the wall using the IP Wall Mount Kit. The Wall Mount Kit is installed as follows:

1. Using the Wall Bracket, mark and drill two 7 mm holes for the plastic wall anchors provided.
2. Insert the two anchors into the holes and insert and tighten the two screws leaving about 6 mm (¼ inch) exposed.
3. Slide the Wall Mount bracket over the screws and tighten securely.
4. Connect a short Cat 5 cable, to the IP Keyset and the wall jack.
5. Mount the IP Keyset onto the Wall Mount bracket.
6. Insert the Wall Mount handset hook to prevent the handset from slipping when wall mounted.

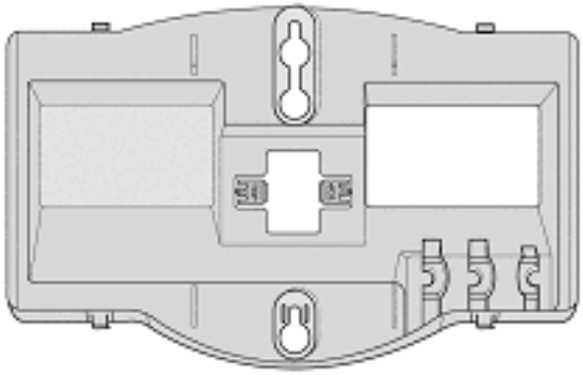


Figure 3-27: Keyset Wall Mount Installation

The DSS installation with IP-24D / 24DH is shown in *Figure 3-28*.

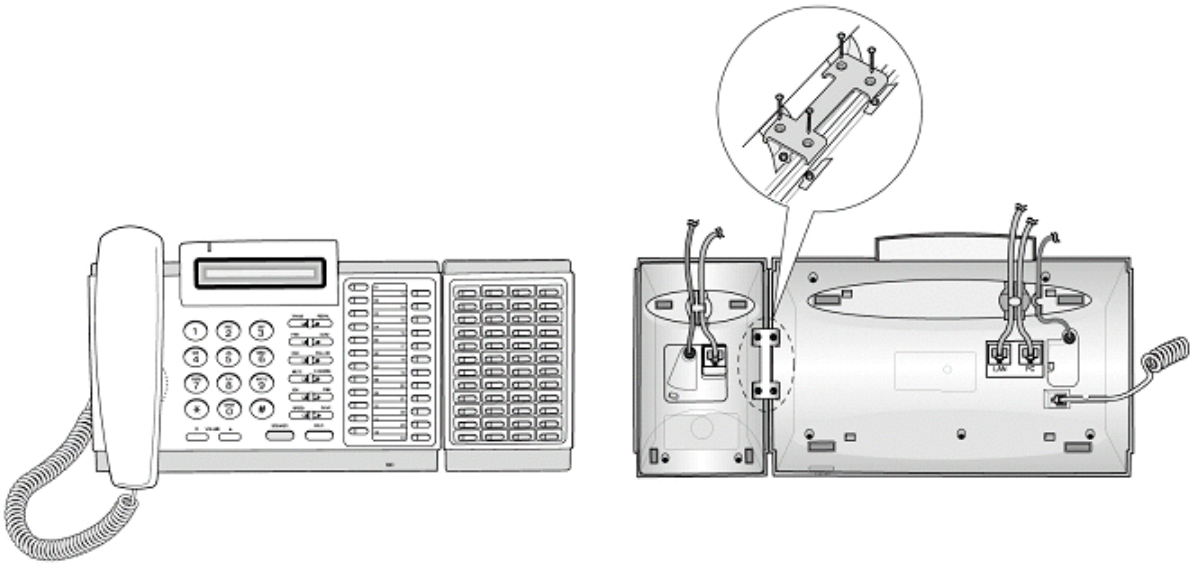


Figure 3-28: DSS Installation

TeleniumIP Quick Setup

The following instructions include slot locations for cabinet installation. When installing without a cabinet, power and network connection procedures should still be accomplished in the order described.

Install and connect the main module (MFIM)

1. Connect all power supplies in the power distribution case and tidy up the cords.
2. Leave the power in the "off" position.
3. Open the main door and slide the MFIM into the slot marked "MFIM" (on the far right side of the Telenium case when viewed from the front).

All modules are installed from the front of the chassis.
When aligned and seated properly, each module will click into place.

4. Connect the power cord to the MFIM.
5. Slide the first SHUB8 module into place.

   It is recommended that this module be installed in Slot 9, next to the MFIM. This helps to make connection of the patch cables follow the flow of communications more closely.
6. Connect the power cord to the SHUB8.
7. Ensure that all dip switches on the front of the SHUB8 are in the "off" position. These dip switches control whether current for powering keysets is delivered through each port.
8. Set the dip switches on the MFIM to the following:

   Switch 1, "off".

   Switches 2, 3 and 4, "on".
9. Using a short patch cord, patch the port labeled "LAN1" on the MFIM into a port on the SHUB8. Select any port except the uplink port.
10. Using another patch cord, patch the port labeled "LAN2" on the MFIM into a port on the SHUB8. Select any port except the uplink port.

Note that the pass-through slots in the bottom inside of the chassis can be used to tuck any excess patch cord length under the chassis.

11. Double-check to make sure that MFIM LAN1 and LAN2 ports are patched into the SHUB8 module, and that no other cords are plugged into any module ports.
12. Turn on power using the switch at the side of the power box.
13. Count 10 seconds, then flip dip switch 4 on the MFIM to "off."

Install additional SHUB8 Modules (optional)

14. Additional SHUB8 modules can be installed in any available slot besides the MFIM slot. For clarity when connecting devices, it is recommended that you place additional SHUB8s next to the first SHUB8.
15. The second SHUB8 can be connected by plugging a patch cord from the uplink port on the first SHUB8 into a numbered port on the second SHUB8. Leave the dip switch for the numbered port in the "off" position. Refer to *Figure 3-29: SHUB8 Connection Diagram on page 3-38*.
16. Connect any subsequent SHUB8s the same way; by patching port 1 into the uplink port of the previous SHUB8.
17. Connect power cords to the SHUB8 modules.

Install IP Keysets

18. Determine which keyset will be the attendant station, and connect it to the network with the supplied patch cord.

Keysets should be installed one at a time because station numbers are automatically assigned by the order in which they are discovered by the MFIM.

19. At the Telenium chassis, plug the RJ-45 connector corresponding to the keyset's location into a port on a SHUB8.
20. Flip the dip switch corresponding to the selected SHUB8 port to the "on" position.
21. Wait 10 seconds for the station to be discovered and assigned station ID 100.
22. Repeat the above steps for each additional keyset.

When moving IP phones from one port to another, it is not necessary to flip the dip switches on the SHUB8 on/off to disconnect or reconnect. Simply ensure that no devices except keysets are plugged into ports with dip switches in the "on" position.

Gateway Port Discovery Process

The discovery process for gateways works the same way as the process for keysets; when a gateway is connected and powered on, the MFIM discovers it and assigns it a port ID.

When connecting a gateway with the optional upgrade module (SLTM2 with SLTU2), it is possible for the second pair of ports to be discovered by the MFIM before the first pair. If this happens, the assigned numbers may not be in the expected order. These port assignments can be changed in the KSU's software if desired. This also applies to other gateway module options, such as DIDM2 with DIDU2 upgrade.

Install SLTM Gateway (optional)

1. Install the SLTM2 module in an available slot. Connect the power cord.
2. Patch the LAN port on the SLTM2 module into a port on a SHUB8.
3. Connect the line cords for the SLT stations to the SLT ports on the back of the SLTM2.

   SLT station assignment is the same as for IP keysets; stations will be discovered and assigned an ID that is one greater than the previous keyset.

Install CO Lines

It is recommended that you install the same line types together (LGCM, DIDM, BRIM) to maintain order. These lines should also be installed one at a time.

SHUB8 Connection Diagram

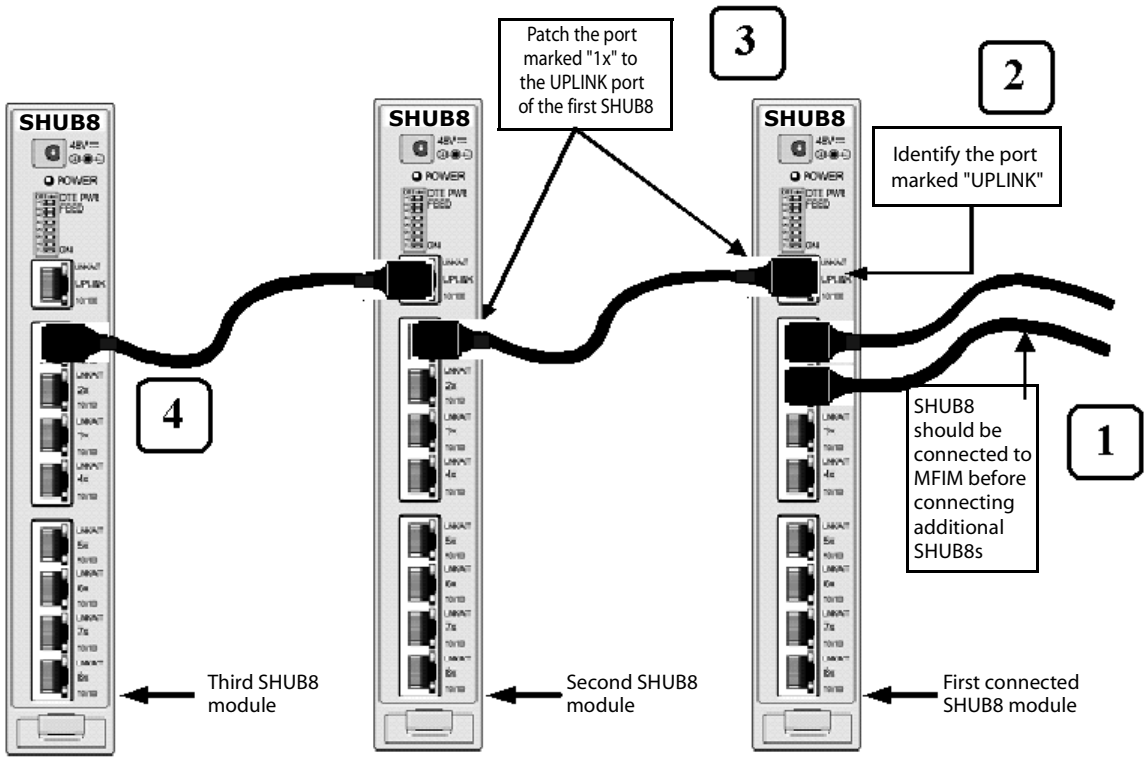


Figure 3-29: SHUB8 Connection Diagram

4 Maintenance and Troubleshooting

This chapter provides information regarding maintenance and troubleshooting procedures for the *Telenium*^{IP} system.

Uses for Gateway RS-232 port

After connecting a serial cable to the RS-232 port on the front of a gateway other than the MFIM, at password prompt enter, IPKTS.

Main > status = gets user to the status prompt

Main : Status > sicofi sr slave (or master) = switches between master or slave processors

Monitoring/Diagnostic/Maintenance

Description

The Monitoring/Diagnostic/Maintenance feature provides monitoring, diagnostic, and maintenance functions. The user can access the IP KTS system and maintain the system remotely and locally. The system can be accessed via Internet or local RS-232C serial interface.

Connection

The following sections describe two methods to access the Monitoring/Diagnostic/ Maintenance feature.

Access Via RS-232 Serial Interface

First, connect one end of an RS-232C serial cable to the RS-232C connector on the MFIM and the other end to the desired Comm Port on the PC.

Use a straight-through DB-9 to DB-9 (female to female) cable.

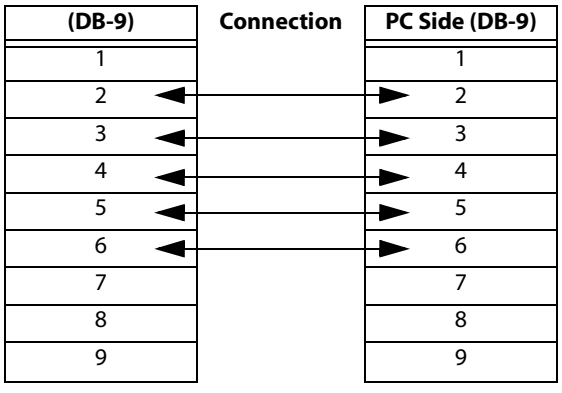


Figure 4-1: MFIM to PC Connection Configuration

Then load a communication software package (e.g., HyperTerminal) into the PC.

After opening HyperTerminal and the New Connection screen displays, complete the following steps:

1. Type a connection name, select the appropriate icon, then click <OK>.
2. When the Phone Number screen displays, change the setting in the "Connect Using" box to: COM1, and then click <OK>.
3. After the COM1 Properties screen displays, change the settings as shown in the following bullets, and then click <OK>.
    - Bits per second = 38400
    - Data bits = 8
    - Parity = None
    - Stop bits = 1
    - Flow Control = None
4. Type the password (mainjob = the password), then press [Enter].
5. Type the desired password, then press [Enter] to access either the Monitoring or Maintenance area.

    Monitoring Password = jennie (lowercase letters)
    Maintenance Password = brandy (lowercase letters)

Access Via IP Network

Load a communication software package (e.g., HyperTerminal) into any PC within the *Telenium*^{IP} Zone.

After opening HyperTerminal and the New Connection screen displays, complete the following steps:

1. Type a connection name, select the appropriate icon, then click <OK>.
2. When the Phone Number screen displays, change the setting in the "Connect Using" box to: TCP/IP (Winsock).
3. Enter the IP address of the MFIM in the box provided for "Host address", enter 5003 in the box provided for "Port number", then click <OK>.
4. Press [Enter] on the keyboard.
5. Type the password (mainjob = the password), then press [Enter].
6. Type the desired password, then press [Enter] to access either the Monitoring or Maintenance area.

    Monitoring Password = jennie (lowercase letters)
    Maintenance Password = brandy (lowercase letters)

Monitor

Description

Monitor commands provide information on boards, devices, CO line status, station status, memory information, etc.

Monitor Commands

After accessing the *Telenium*^{IP} system with HyperTerminal, type the monitor password (jennie) and press [Enter]. A "**mon >**" prompt appears. Monitor commands are used by typing in the desired command after the "**mon >**" prompt and then pressing [Enter]. The following are monitor commands and their descriptions.

Monitor Commands	Descriptions
t b xx (xx = board slot #)	sets board trace
t d	deletes all current trace commands & reverts to idle condition
t s call	sets (turns on) virtual dip-switch for call trace
t s voip	sets (turns on) virtual dip-switch for VOIP Gateway trace
t s http	sets (turns on) virtual dip-switch for Web-Server trace
t s poll	sets (turns on) virtual dip-switch for device polling process
t s smdi	sets (turns on) virtual dip-switch for SMDI trace
t s callid	sets (turns on) virtual dip-switch for Multicast ID trace
t s all	sets (turns on) virtual dip-switch for all traces
t r call	resets (turns off) virtual dip-switch for call trace
t r voip	resets (turns off) virtual dip-switch for VOIP Gateway trace
t r http	resets (turns off) virtual dip-switch for Web-Server trace
t r poll	resets (turns off) virtual dip-switch for device polling process
t r smdi	resets (turns off) virtual dip-switch for SMDI trace
t r callid	resets (turns off) virtual dip-switch for Multicast ID trace
t r all	resets (turns off) virtual dip-switch for all traces
t c s xxx (xxx = Sta #)	sets device command trace for a station (Refer to *Table 4-1, "Command Event Trace Explanation," on page 4-7*)
t e s xxx (xxx = Sta #)	sets event trace for a station
t a s xxx (xxx = Sta #)	sets trace mode, full or brief (toggle)
t p s xxx (xxx = Sta #)	displays trace option configurations
t c c xxx (xxx = CO line #)	sets device command trace for a CO line (Refer to *Table 4-1, "Command Event Trace Explanation," on page 4-7*)
t e c xxx (xxx = CO line #)	sets event trace for a CO line
t a c xxx (xxx = CO line #)	sets trace mode, full or brief (toggle)
t p c xxx (xxx = CO line #)	displays trace option configurations

Monitor Commands	Descriptions
vlog hh (hh = bit)	sets trace options for H.323 protocol stack log. Bit values are: 07 - LOG_DEBUG 03 - LOG_ERR 06 - LOG_INFO 02 - LOG_CRIT 05 - LOG_NOTICE 01 - LOG_ALERT 04 - LOG_WARNING 00 - LOG_EMERG
d xxx (xxx = address 1) xxx (xxx = address 2)	dumps memory between the two addresses, which are in hex-decimal form. If only a single address is entered, the one page memory area (composed of 320 bytes) will be dumped.
m xxx (xxx = address)	modifies the value of specified memory area
dc	displays registered device configurations
c xxx (xxx = CO line #)	displays CO line status
c xxx [d] (xxx = CO line #)	displays CO line structure format data
s xxx (xxx = Sta #)	displays station status
s xxx [d] (xxx = Sta #)	displays station structure format data
x	exits the Monitor Commands area
?	displays the monitor command list and descriptions

You can also set virtual dip-switch via IP Keyset using PGM 452, Btns 1-7.
Btn 1 = Call Trace
Btn 2 = VOIP Trace
Btn 3 = http Trace
Btn 4 = SMDI/in-band for voice mail Trace
Btn 5 = Device Polling. MFIM checks if devices are still connected. By default, this is turned on.
Btn 6 = Multicast Trace
Btn 7 = Multicast LED

Table 4-1: Command Event Trace Explanation

Raw event trace format:

789392 E>14 01 10, A0 02-8229

789392 : serial number
E> : event
14 : slot (gateway) number
01 : device type (eg, 01 = IPKTU, 40 = LGCM)
Device types:
01 = IP phone
03 = SLTM
40 = LGCM
42 = DIDM
61 = BRIM
70 = VOIP
D0 = VSF
E0 = MISC
10 : device sequence number (eg, 01 = STA100, 02 = STA101 ...)
Device sequence number types:
Station sequence numbers = 1-70 (same source and port # as in PGM 105)
CO Line sequence numbers = 1-42
A0 : event number
02- : length of the event
8229 : parameter(data) of the event

Analysis raw event trace format:

789392 STN:01 10 St:IDLE (00) Ev-I:CO KEY P1: A P2:0 EVT: 48

789392 : serial number
STN:01 10 : Station type 01 and number 10
st:IDLE : station state is IDLE
EVT-I:CO KEY : event type is internal event, event name is CO KEY event
P1: A P2:0 : Parameter 1 is A, parameter 2 is 0
EVT: 48 : The event call module number 48 in source

Raw command trace format:

789392 C>14 01 10, A0 05-0103600000

789392 : serial number
C> : Command
14 : Slot number
01 : device type (e.g., 01 = IPKTU, 40 = LGCM)
Device types:
01 = IP phone
03 = SLTM
40 = LGCM
42 = DIDM
61 = BRIM
70 = VOIP
D0 = VSF
E0 = MISC
10 : device sequence number (e.g., 10 = Station port number 10)
Device sequence number types:
Station sequence numbers = 1-70 (same source and port # as in PGM 105)
CO Line sequence numbers = 1-42
A0 : Command number
05- : length of the command
0103600000 : parameter(data) of the command

Diagnostic/Maintenance

Description

The systems Diagnostic and Maintenance function permits on-demand testing to assist in diagnosis of the system.

Diagnostic/Maintenance Commands

After accessing *Telenium*^{IP} system with HyperTerminal, type the diagnostic/maintenance password (brandy) and press [Enter]. A "**maint >**" prompt appears. Maintenance commands are used by typing the desired command after the "**maint >**" prompt and then pressing [Enter].

The following are diagnostic/maintenance commands and their descriptions.

Diagnostic/Maintenance Commands	Descriptions
chkdsk c: /c	*scans disk
chkdsk c: /f	*scans disk and fixes disk
chr xxx.xxx.xxx.xxx (start address) xxx.xxx.xxx.xxx (end address)	NVRAM test - checks to validate non-volitile RAM data and displays results. Reads previous check conditions and computes CRC-32 data.
chw xxx.xxx.xxx.xxx (start address) xxx.xxx.xxx.xxx (end address)	NVRAM test - checks to validate non-volitile RAM data and displays results. Computes CRC-32 data for specified area and saves its results to disk file.
dc	displays device configuration table
dir c:	*displays all files in the NAND flash disk
dir d:	displays all files on the RAM disk
ds	displays status of all devices
dt xxx (xxx = device number)	displays the diagnostic test result from the specified device system
ds xxx (xxx = device number)	displays status of a specified device
fio c: r [cluster-num sector-num offset-num read-bytes]	maintains disk in/out control for low-level operation - read block (use after cluster/sector/ offset info displayed with chkdsk command(s)
fio c: w [cluster-num sector-num offset-num write-hex-string]	maintains disk in/out control for low-level operation - write data (use after cluster/sector/ offset info displayed with chkdsk command(s)
fio c: r d [cluster-num]	maintains disk in/out control for low-level operation - erase a cluster (use after cluster info displayed with chkdsk command(s)
fio c: w	maintains disk in/out control for low-level operation - write data
fio c: d	maintains disk in/out control for low-level operation - erase a cluster
format c:	*formats disk
del C:xxxxxx (xxxxxx = file name)	*deletes specific file from flash
lf	displays the number of line faults that occur

Diagnostic/Maintenance Commands	Descriptions
log gw clear	clears previous gateway logs
log gw view	displays specific gateway logs
log mfim clear	clears previous MFIM logs
log mfim view	displays the system reset logs held in the MFIM
nr	displays networking resources table (IP addresses and subnet addresses)
ns xx (xx = code) xxx.xxx.xxx.xxx Codes: hi = setting MFIM address hm = setting MFIM subnet mask value hg = setting gateway IP address cs = setting start address for clients ce = setting end address for clients cm = setting network mask for clients	changes network settings
p xxx.xxx.xxx.xxx	pings (test) to determine if IP line to MFIM (or other specified device) is operational. Use a space after "p" in the command.
ren c: xxxx (old name) xxxx (new name)	*renames file
reset 0	resets system
reset all	reassigns all IP addresses
reset ip	used when replacing MFIM, if user wants to keep addresses of all system devices
reset mac	resets MAC address
reset xxx (xxx = slot number)	resets a slot
ta all xx (xx = time code) Time Codes: lh = last hour tp = today peak tt = today total yp = yesterday peak yt = yesterday total	prints all traffic report
ta atd xx (xx = time code) Time Codes: lh = last hour tp = today peak tt = today total yp = yesterday peak yt = yesterday total	prints attendant traffic
ta callhour	prints call hourly report
ta callsum	prints call summary report
ta cohour (cogrp#)	prints CO traffic hourly report
ta cosum xx (xx = time code) Time Codes: lh = last hour tp = today peak tt = today total yp = yesterday peak yt = yesterday total	prints CO traffic summary report

Diagnostic/Maintenance Commands	Descriptions
ta hw xx (xx = time code) Time Codes: lh = last hour tp = today peak tt = today total yp = yesterday peak yt = yesterday total	prints hardware usage summary report
ta period (hhmm) xx (xx = time code) Time Codes: lh = last hour tp = today peak tt = today total yp = yesterday peak yt = yesterday total	prints traffic report periodically
ta period_abort	cancels periodic report
x	exits the maintenance function (To regain the password prompt, press [Enter].
?	displays the maintenance command list and descriptions

Warning: Diagnostic / Maintenance Commands in the preceeding table that are marked with an asterick are not to be used unless specifically instructed to do so by Technical Support personnel. Unauthorized use of these commands will create fatal errors in programming that will require lengthy reconstructive efforts.

Software Upgrade Process

Occasionally there may be system software improvements to either fix problems or to add enhancements.

For information pertaining to software upgrade procedures, refer to *Chapter 13, Upgrades / Uploads / Downloads* in the *Telenium*^{IP} System Programming Manual.

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